

# MUNICIPAL JOURNAL AND PUBLIC WORKS.

CITY

COUNTY

STATE

VOLUME XLVIII  
No. 2

New York, January 17-24, 1920

Weekly—\$3.00 a Year  
10 Cents a Copy

Entered as second-class matter January 3, 1906, at the Post Office at New York, N. Y., under the Act of March 3, 1879.



Two sections of Marquette-Negaunee Road, Marquette County, Mich. These roads were water-bound macadam, surface-treated with "Tarvia-B" in 1917 and 1918. This is the main line of travel between the busy mining cities of Ishpeming and Negaunee, Mich. A traffic census revealed the passage over this road of 1080 vehicles per day the majority of which were automobiles.

## You can have roads like these—

IF there are, in your community, plain macadam roads that are beginning to wear in spots, or to "ravel," you certainly ought to know about this Marquette-Negaunee Road—

It will show you how, at small expense, you can save your roads and make them smooth, dustless and durable.

Like many roads built in this country a few years ago, this Marquette-Negaunee road was plain water-bound macadam construction. But after it had been in use for a while the road authorities of Marquette County discovered that plain macadam would not stand up under the torture of modern traffic.

The road authorities had to find some way to

save their road, which is an important main highway carrying heavy traffic. They turned to Tarvia as the surest and most economical solution to the problem.

**Tarvia**  
Preserves Roads  
Prevents Dust—

They treated the road surface with "Tarvia-B" in 1917. In some places where the wear had been particularly severe a second treatment was applied in the summer of 1918.

And the road can be kept in this same wonderful condition at small expense by occasional Tarvia treatments.

### Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested. If you will write to the nearest office regarding road problems and conditions in your vicinity the matter will be given prompt attention. Booklets free.

New York  
Cincinnati  
Minneapolis  
Duluth  
Lebanon  
THE BARRETT COMPANY, Limited:

Chicago  
Pittsburgh  
Nashville  
Dallas  
Youngstown

Philadelphia  
Detroit  
Salt Lake City  
Milwaukee  
Toledo  
Montreal

The **Barrett** Company  
Columbus  
Toronto  
Richmond  
Winnipeg  
Latrobe  
Vancouver

Boston  
New Orleans  
Seattle  
Bangor  
Elizabeth  
St. John, N. B.

St. Louis  
Birmingham  
Peoria  
Washington  
Buffalo  
Halifax, N. S.

Cleveland  
Kansas City  
Atlanta  
Johnstown  
Baltimore  
Sydney, N. S.



**BITUMENIZED ROAD MIXTURES**  
*The* **HETHERINGTON ROAD PLANT**  
**HAS NO EQUAL**  
**1300 SQ. YARDS PER DAY**  
**HETHERINGTON & BERNER** **INDIANAPOLIS, IND.**

**Asphalt Sales Dept.**  
**OFFICES**

New York	Houston
Boston	Chicago
Philadelphia	Cleveland
Richmond	Toledo
Jacksonville	Kansas City
Tampa	Des Moines
New Orleans	Minneapolis
Memphis	Wichita

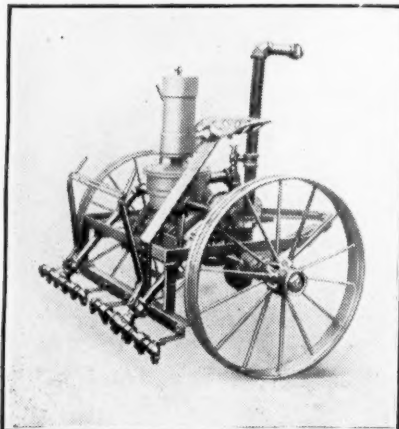
**TEXACO** **ASPHALT ROAD OILS**  
**THE TEXAS COMPANY**

Asphalt Sales Department  
17 BATTERY PLACE, NEW YORK CITY



**THE UNITED STATES ASPHALT REFINING COMPANY**

90 West Street, New York



**FOR ROAD OILING**

**USE A RELIANCE OIL SPRAYING TRAILER**

It is not necessary to own an expensive oiling wagon—our trailer will do the work exactly as well with **ONE-HALF** the investment.

**Will save its cost in one season**

*Let us quote you prices*

**UNIVERSAL ROAD MCHY. CO.**  
**KINGSTON, N. Y.**

**RELIANCE LABOR SAVING ROAD BUILDING EQUIPMENT**

# Municipal Journal & Public Works.

City

County

State

Published Weekly by MUNICIPAL JOURNAL & ENGINEER, INC., at 243 West 39th Street, New York  
S. H. HUME, President J. T. MORRIS, Treasurer A. PRESCOTT FOLWELL, Secretary

Vol. XLVIII.

NEW YORK, JANUARY 17 and 24, 1920

No. 2

## Subscription Rates

United States and Possessions, Mexico and Cuba.....\$3.00 per year  
All other countries.....\$4.00 per year  
Entered as second-class matter, January 3, 1906, at the Post Office at  
New York, N. Y., under the Act of Congress of March 3, 1879.

## Change of Address

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Telephone (New York): Bryant 9591  
Western Office: Monadnock Block, Chicago

A. PRESCOTT FOLWELL, Editor  
SIMON BARR, Assistant Editor

## Contributed Articles and Reports

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal and Public Works regularly their annual and special reports.

## Information Bureau

The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

## Contents of This Issue

Editorial Notes .....	19
Private Preparedness vs. Public Procrastination—No Long-Time Bonds for Short-Time Roads—Get Road Materials Now.	
Garbage Disposal in Chicago.....	20
Sewage Works Manager a Healthy Vocation.....	20
Garbage Collection by Trailer and Tractor (Illustrated)...	21
In this article Stanley E. Bates describes how to calculate, for any given city, the numbers of trailers, tractors, horses and men needed, and the cost of the service.	
Water Meters Recommended for St. Louis.....	24
Comparison of High Duty and Centrifugal Pumps.....	24
A calculation by L. A. Day, of the St. Louis water works, of the relative economy of triple-expansion, fly-wheel pumps and turbine-driven centrifugal.	
Sewering War-Time Housing Developments (Illustrated)...	25
Conclusion of article begun in the previous issue. Tells of the sewage treatment methods adopted for the different developments and aviation fields.	
Larceny of Water, Gas and Electricity.....	28
Review of court decisions in the several states as to the various phases of this subject. By John Simpson.	
Blasting Down Highway Banks.....	30
Sewer Maintenance in Chicago.....	30
The Week's News.....	31
Legal News—Notes of Recent Decisions.....	35
News of the Societies.....	36
New Appliances (Illustrated).....	37
Industrial News .....	38
Contract News .....	19
The Municipal Index.....	21

## Private Preparedness vs. Public Procrastination.

Already merchants in the clothing trade are studying the styles for next summer and placing their orders, while manufacturers are deciding on the patterns for next fall. But Mr. Merchant and Mr. Manufacturer, as members of the city's board of public works or council committee on paving, sewers or water works, have not thought ahead even so far as next spring. They apparently act on the principle "Sufficient unto the day is the evil thereof," and that is a big reason why it so often is evil.

Whatever may be said about other features of municipal government, constructing public works is business, and cannot be done economically and otherwise satisfactorily unless business forethought be used by those in charge.

## No Long-Time Bonds for Short-Time Roads

"Long-time bonds should not and must not be used to build short-time roads. We cannot consent to any improvement paid for with borrowed money—money borrowed for a long period of time—that is not an improvement of a durable type. Any other plan would be extravagant waste."

With these words the State Highway Department of Pennsylvania last month refused the application of one of the counties of that state for permission to issue bonds for constructing cinder roads. There can be no question about the wisdom of that decision for this and every similar case. Such a practice would as surely bring a disastrous day of reckoning as would living beyond one's income and issuing notes for the deficit.

## Get Road Materials Now

There is money available for three times as much road work in 1920 as has ever been constructed in one year in this country. The problem is to get this amount of work done before next December—and it is going to be a difficult one. Every day of the year must be utilized to the best advantage if this amount of construction is to be even approximated.

Except in the southern part of the United States it will be impracticable to begin road construction and reconstruction for ten or twelve weeks yet; but this does not mean that nothing can be done. A great deal can be done, and those who realize this and get busy now will get more and better work done than those who do not.

The year's work should be planned, surveys made, specifications completed, contracts let, new machinery purchased and old put in good condition, and engineers, inspectors, foremen and other members of the force necessary for supervising the work should be arranged for at the earliest possible date.

Machinery, contractors, men and materials will be in great demand and it is probable that those who do not get these early will have to take the "leavings"—if there are any.

It is anticipated that the obtaining of materials will be an especially serious problem. It has been estimated that 120 million tons of road materials (mostly stone, gravel and sand) will be needed to carry out the program. The railroads can not possibly carry this amount during the working season.

To relieve the situation, hauling should begin at once; and this not only to save time. Most of the material will have to be distributed by teams or trucks, and in the spring the condition of most unimproved roads is the worst of the year for heavy hauling. Before the frost comes out, two tons can be hauled with the same equipment that would find difficulty in hauling one ton during the weeks of early spring. Getting the materials distributed now will save both time and money. Moreover, teams are more readily obtainable now than they will be when farming begins.

It may be possible to reduce the length of haul by locating or developing additional sources of supply. If the highway officials of every state, county and town would investigate for deposits of suitable rock, gravel and sand within their boundaries, and arrange for beginning the working of them at once, many of them could undoubtedly greatly reduce the transportation charges on materials for their roads, even eliminating the railroad haul entirely in many cases by hauling by motor trucks directly from quarry, stone crusher, or bank to the job.

As we have suggested before, the delivery of materials can be begun at once if the public authorities will purchase them direct and turn them over to the contractors with whom arrangements may be made later for doing the work. This has been done already by officials in some states.

The states and counties which, when the working season begins, have on hand, at the sites of the proposed jobs, a considerable percentage of the materials needed for those jobs, will have taken a long and important step toward completing their year's program.

### Garbage Disposal in Chicago

The Bureau of Waste Disposal of the Department of Public Works of Chicago, according to the latest report of the general foreman in charge, L. F. King, that for the year 1918, disposed of 84,974 tons of garbage, which was 15.1 per cent less than in 1917. This was treated at the municipal reduction plant and produced 3,198,177 pounds of grease, which sold at an average of 11.41 cents per pound; and 15,789.1 tons of tankage, which sold at an average of \$12.43 per ton.

The total receipts from products of the plant were \$535,538.59, of which \$10,142.15 was for rags, tin cans, bones, animal grease, hides and miscellaneous scrap. In addition, the inventory of products on hand at the end of the year was \$36,910.32 greater than the year previous; giving a total credit of \$572,448.91 against an operating expense of \$489,500. This operating profit of \$82,878.91 is the first in the history of the plant. The

expenditures referred to include salaries and wages, \$259,818; fuel oil, \$86,500; power and light, \$14,801; coal, \$34,673, and supplies and repairs, \$93,778. Nothing is included for depreciation, interest and overhead generally. In 1917 there had been a loss of \$31,011.69 on operation alone, and in 1916 a loss of \$75,948.85, thus showing increasing deficit.

The method of selling the products of the plant by contract, after advertising, resulted in securing less revenue than would have been secured by selling them from day to day or week to week, according to market conditions. Since November 1, 1918, the City Council permitted the bureau to sell the products in the open market. The contract method was unsatisfactory because "the contractors have invariably raised disputes and failed to pay for all of the products delivered. By selling in the open market the city of Chicago will at all times receive the prevailing market price and immediate payment for its products, and thus legal controversies will be avoided."

In addition to the reduction plant, the bureau operated an incinerator at which was burned 15,496 tons of South Water street refuse.

The amounts of garbage received, totaled by months, varied from 2,388 tons in January to 10,079 tons in August; but only January and February fell below 6,000 tons. In 1917, May was the month of lowest record, no other month being below 5,900 tons.

While the amount of garbage received in 1918 was 15.1 per cent less than in 1917, the amount of grease recovered was 20½ per cent less. The amount received from sale of grease, however, was 21 per cent greater, and the receipts from tankage were 32 per cent greater although the amount was about 30 per cent less.

The costs of operating the reduction plant, per ton of raw garbage, averaged \$3.057 for salaries and wages; \$1.018 for fuel oil; \$0.174 for power and light; \$0.408 for coal, and \$1.104 for supplies and repairs.

The prices received were 11.405 cents per pound for garbage grease, 13 cents for animal grease, 25.5 cents for hides, from \$10 to \$16.85 per ton for tankage, \$4 for tankage unmilled and degreased, \$4.50 for that remilled and reloaded, and \$2 for tankage screened and reloaded. Tin cans brought \$2 per ton, rags \$9, bones \$20, metals from \$2 to \$9.

### Sewage Works Manager a Healthy Vocation

Theoretically we suppose the vocation of the Sewage Works Manager should, on account of working and residing in the midst of noxious smells, be an unhealthy one. But Sewage Works Managers and their wives and families are about as healthy a class of people as can be found, and their sickness and death rates are low. At the annual gathering of Sewage Works Managers in London last week it was difficult to find an individual who was not in remarkably robust health. It is interesting, too, to notice how the affinity for the work runs in families. Sons commonly follow in the footsteps of their fathers, and several brothers occupy similar positions. Probably the most interesting illustration is that of the family of Messrs. Ledson Brothers, four of whom are Sewage Works Managers in different towns, viz., Mr. Henry Ledson (Rochdale), Mr. D. Ledson, (Sewage Works, Leigh, Lancs.), Mr. Thos. Ledson (Swinton, near Manchester), and Mr. E. Ledson (Walton Farm, Liverpool Corporation). They are, moreover, all enthusiastic workers, and devoted, as is so general with Sewage Works Managers, to their work.

*Municipal Engineering & The Sanitary Record, England.*



TRACTOR AND FOUR TRAILERS HAULING REFUSE IN UTICA, N. Y.

## Garbage Collection by Trailer and Tractor

Using this method three or four trailers are drawn by horses while collecting, and are then coupled up to form a train and hauled by tractor to the point of disposal. In this article Stanley E. Bates explains how to calculate how many trailers, tractors, horses and men can be used to the best advantage, and the cost of the service, giving illustrations of making such calculations.

The following remarks and calculations relative to the collecting and transporting of garbage or ashes by the use of trailers and tractor were prepared by Stanley E. Bates, Assoc. M. A. S. C. E., vice-president of the Lee Loader & Body Co., to give advice on a special case, but the ideas and figures contained seem to afford so much information that should be of value to municipal officials engaged in this work that we are reproducing the discussion, with only minor changes in the arrangement and omissions of unessential matter.

It seems to have been generally agreed that in most cases it is not economical to use motor trucks for collecting either ashes or garbage, owing chiefly to the numerous stops and low velocities. On the other hand, it seems more economical to use motor vehicles for long hauls of garbage or ashes after collection in transporting them to the point of disposal. The tractor-trailer system has been developed and has been tried out by several municipalities in an effort to combine the advantages of both motor traction and horse draft in this service.

A necessary preliminary to designing a system of collecting garbage or ashes is to determine the amount which must be collected in each section of the city, the frequency of collection and the length of haul from the several collection areas to the point of disposal. Unit costs of teams, labor, motor truck service, etc., including

all items such as overhead, depreciation, etc., should be ascertained for use in the calculation.

### THE TRACTOR-TRAILER PLAN OF COLLECTION.

The ordinary method of collection by tractor and trailers may be described briefly as follows: The trailers are drawn by horses while picking up the garbage or ashes. This is because of the frequency of the stops and also because a trailer will not ordinarily travel more than ten miles a day while collecting, which small mileage is usually uneconomical for truck operation.

The collection routes are so laid out that the three or more trailers composing one unit will meet at a certain previously determined point when they have collected their loads. At this point the horses are unhitched from the trailers and a certain number, usually three, are fastened together in the form of a train. A tractor is coupled to this train and pulls it to the dump, incinerator, or pig farm, as the case may be. Meantime, each team of horses is hitched to an empty trailer and the three empties start out collecting material in the next sections of the town, which also have been so laid out that, when filled, the trailers will again meet at another predetermined point. Here again the tractor, returning with the empty trailers, exchanges these for the loaded ones and the process is repeated continuously.

Thus operated, an operating unit consists of one tractor, six trailers, three teams of horses, three drivers, a

chauffeur and the necessary helpers. There must be enough of these operating units to take care of the entire amount of garbage or ashes produced in the city, with the frequency of collection previously determined upon.

Such a unit may be considered as an average, but sometimes a tractor can pull four trailers, as is done in Utica, N. Y., while in other cases only two trailers can be drawn on account of hills or poor condition of the roads. The size of the tractor's motor, of course, determines how much the tractor will pull.

#### ILLUSTRATIONS OF OPERATION.

In the illustrations given below it is assumed that the tractor is strong enough and grades level enough to permit satisfactory service from an operating unit of one tractor and six trailers (three to a train) or its equivalent.

**Illustration No. 1.**—Assume a 4-mile haul, 2 miles to the dump and 2 miles back. In this case time estimates are as follows:

Coupling and uncoupling trains.....	10 minutes
Running, at 8 miles per hour.....	15 minutes
Dumping three trailers.....	6 minutes
Returning from dump, at 10 miles per hour.....	12 minutes

Total time per trip of tractor..... 43 minutes

These are believed to be conservative figures. If the men work well they can couple and uncouple in 2 minutes instead of 10, and can dump the three bodies in 2 minutes instead of 6. Furthermore, a 5-ton tractor is ordinarily governed to run at 14 miles per hour, but the running time is given as 8 miles per hour loaded and 10 miles light to allow for possible delays.

If it takes 43 minutes for each trip of the tractor, then the tractor could make 11 trips a day. If it hauls three 2½-ton trailers with 3½-cubic yard dump bodies, it will haul in a day of eight hours 82½ tons or 115½ cubic yards.

According to these figures, 33 minutes is allowed for the team drivers and lifters to fill three trailers with material while the tractor with the other three trailers is away at the dump. This brings up the third important point governing the number of tractors and trailers required by any city—the time required for collection. This will vary widely in different cities, some of the factors being the following: (1) Whether receptacles

have to be carried from the cellars or back yards or whether they are placed conveniently for the pick-up men in the alley or on the street curb. (2) Whether receptacles are provided for all materials or whether some have to be shoveled up into the bodies. (3) Whether receptacles are of small size or of such a large size that two men are required to lift them. (4) Whether the houses or apartment buildings are close together or far apart; in other words, the density of population. If the population is very dense, collection will be faster than if it is sparse.

Experience in Indianapolis shows that a team driver and one lifter will fill a 3½-yard body on a trailer with ashes in 30 minutes. The Indianapolis trailers are filled very full, the load being crowned up in many cases to such an extent that 5½ yards are placed in 3½-yard bodies.

A trailer crew of one team driver and one lifter is very satisfactory, but other combinations are possible. For example, if a haul were shorter than 2 miles, so that the tractor would return with the empty trailers in less than 33 minutes, it would be advisable to have two lifters instead of one; while perhaps some cases might justify three lifters, but this is doubtful. On the other hand, if the haul were longer, it might be possible to get along without any lifter at all, the driver doing all the work. This, however, would be possible only if there were no large and heavy cans to be lifted and dumped into the trailer.

**Illustration No. 2.**—Assume a haul of 20 miles in the round trip. In this case the time figures would be as follows:

Coupling and uncoupling of trains.....	10 minutes
Running to dump, 10 miles at 8 miles per hour....	75 minutes
Dumping three trailers.....	6 minutes
Returning, at 10 miles per hour.....	60 minutes

Total time per trip of tractor..... 2 hours 31 minutes

In this case the time the tractor is away is very much greater than that necessary for filling the trailers. It might be advisable to have only one team of horses, one driver and one lifter to take care of all three trailers, instead of one of each for each trailer. In that case the team would be hitched to one empty trailer, leaving the others on the street; when the first trailer had been filled it would return to the point where it started, and the team would then be hitched to the second trailer,



COLLECTING REFUSE IN HORSE-DRAWN TRAILER, UTICA, N. Y.

another route collected and then a third route with the third trailer.

If it required only thirty minutes or so to fill each trailer, even then the horses and men would have about an hour to wait before the truck returned with the empty trailers. But, in spite of this wait, this system might be more economical than any other that could be devised. However, there are other possible alternatives. For example, the operating unit might consist of two tractors and nine trailers. In which case the operation would be as follows:

**Illustration No. 3.**—While tractor A is making its first trip with loaded trailers 1, 2 and 3, trailers 4, 5 and 6 are making collections. Meantime, tractor B returns from the dump with empty trailers 7, 8 and 9 and starts back with loaded trailers 4, 5 and 6, while trailers 7, 8 and 9 at once start out to collect material. Tractor A returns with empty trailers 1, 2 and 3 and exchanges them for loaded trailers 7, 8 and 9, trailers 1, 2 and 3 starting out to collect, thus completing the first cycle.

The time study would be the same as above except that, instead of the drivers and lifters having 2 hours and 21 minutes to fill three trailers, there would be only 1 hour and 10½ minutes to do this work. In this case, also, it might be possible to operate the trailers with one team of horses and one driver with no lifter.

Another possibility would be an operating unit consisting of three tractors and twelve trailers. The cycle would be similar to that above, there being nine trailers always on the road to or from the dump and three trailers collecting. In this case nine trailers are filled in the time which it takes a tractor to remove and return three trailers.

#### ESTIMATING COST.

On the basis of a discussion similar to the above, it is possible to determine the number of trailers required, number of tractors, number of teams, chauffeurs, team drivers and lifters, the number of miles traveled per day by tractor, by teams and by trailers. These figures having been ascertained, it is possible to calculate the cost per day or per week or per month of each operating unit and of the total number of operating units used by the city.

In addition to the chauffeurs, team drivers and lifters, it will be necessary to have two helpers riding on the tractor-trailer train to assist the chauffeur in coupling up the trailers, dumping the bodies, etc.; a man at each dump; a barn boss and perhaps assistants, depending on the number of horses that are stabled, and one or more mechanics for making repairs to tractors and trailers. (The last should not be included again in the cost of repairs to tractors and trailers referred to later on in the calculation.)

In addition to the above employes, there will probably be inspectors, clerks, stenographers, superintendents and other members of the organization, these being practically the same as would be used under any system of collection. The cost of these can generally be determined from past records. If it is merely desired to calculate the difference in cost between present methods and the tractor-trailer method, these items can be eliminated entirely, as they would be the same for both methods.

Knowing the miles traveled per day by the tractor, the cost of gasoline can be estimated at 2 miles per



DUMPING REFUSE FROM TRAILERS, UTICA, N. Y.

gallon, and the oil consumption at 1 gallon per tractor per day.

Interest should be calculated on the investment, including the total cost of the original equipment, at current interest rates; the equipment including tractors, trailers, horses, harness, horse-poles and all miscellaneous equipment.

Depreciation of the tractor should be figured on its original cost less the cost of the tires, the tire depreciation being figured separately. It is customary to assume that the tractor will run 100,000 miles before being scrapped. Knowing the average number of miles run per day, the daily charge for depreciation can be figured.

Depreciation on trailers is figured in exactly the same way, but the distance run is not so great. It is logical to figure that the trailers depreciate only when being hauled by the tractors, neglecting the distance they are hauled by teams, since this hauling is done at very slow speed.

Repairs at best can be only a guess. If the city has operated a 5-ton truck, figures of previous costs of such trucks can be used. If such figures are not available, assume \$1.50 a day per truck, which is quite safe. It is believed that 50 cents a day is ample allowance for repairs to trailers.

Depreciation on tractor tires is obtained by dividing the cost of a new set of tires by their guaranteed mileage, obtaining the cost per mile, and multiplying this by the number of miles traveled per day, which will give the tire depreciation per day. This is a safe figure, as tires should last longer than their guarantee.

Depreciation on trailer tires is figured in the same way, but using twice the guaranteed mileage. Experience shows that this is a safe assumption, because trailer tires do not wear out nearly so fast as truck tires, there being no driving wheels and therefore less abrasion. Moreover, while the trailers are being hauled by horses they travel at a very low speed. Many trailer tires last three times their guarantee.

In figuring the cost and upkeep of the horses, a team of 1,400-pound horses should be considered for hauling a 2½-ton trailer. Unless the town is very hilly, horses of this weight are heavy enough to stand the work six days a week, since pick-up work is not especially heavy, the trailers are on roller bearings and are therefore easier to pull than wagons with plain bearings, the horses probably will not have to travel more than 10 or at most 15 miles per day, and they will never pull a full load more than a few hundred feet, their average load being only a half load because the trailer is empty when it starts. Local figures can usually be obtained for the

cost of a horse. In Chicago a 1,400-pound horse costs from \$200 to \$250, but this may not hold for other cities.

The working life of a horse pulling trailers of this kind can safely be taken at from six to eight years, which gives a basis for figuring interest and depreciation on the investment. The harness for a team will cost about \$100 and last as long as the team itself. Repairs to the harness will be a very small item; if figures are unobtainable, this item can perhaps be neglected.

Each horse will require on the average the following per day:  $\frac{1}{4}$  bushel of oats,  $\frac{3}{4}$  pound of bran, 20 pounds of hay, 1-10 barrel of shavings for bedding. Local unit prices of these items can be obtained at any feed store.

In addition to the above, each horse will need shoeing at least once a month, which will cost not to exceed \$5.00. There will be other small items which can be grouped under the heading of veterinary services, which 10 cents per day per horse should cover. A study of local conditions will show what amount should be charged for rent of garage and stable.

Unless the installation is very small, extra equipment will be necessary to prevent interruption in operation. If the installation is large enough to require ten tractors, it will perhaps be necessary to have an extra tractor to take the place of one which may be laid up from time to time for repairs. For the same reason an extra trailer should be provided for every twenty needed for continuous use. The same applies to horses, but the ratio might be as low as one to six, because a horse must be laid off at intervals to be shod if for no other purpose.

#### STREET GRADES.

Throughout the above discussion it is assumed that the city in question does not have long grades of more than 5 or 6 per cent. But even if long grades do exceed this slope, it does not necessarily mean that the tractor-trailer system of collection cannot be used. The writer recently visited a city the main portion of which was quite hilly, but the surrounding country reasonably flat. Garbage was to be disposed of at a pig farm located about 10 miles from the city limits. It was suggested tentatively that if the tractors could not haul three loaded trailers up the grades found within the city limits, they could haul one or two at a time up to a central collecting point at the edge of the town on the road to the pig farm, this collecting point being just past the last steep grade. At this point the trailers would be combined into trains of three or four and hauled the 10 level miles to the pig farm with economy.

#### Water Meters Recommended for St. Louis.

In his 1919 annual report, Edward E. Wall, water commissioner of St. Louis, recommends the installation of water meters at once to permit postponing an addition to the pumping-plant and pipe system. The average daily consumption for the past year was 100,000,000 gallons, or 128.5 gallons per capita; 60 per cent of which is pumped from Bissell's Point through mains which cannot carry more than 65,000,000 gallons a day without an excessive friction loss of more than 70 feet head.

Should meters be installed and the consumption be reduced to 90,000,000, the present pumping capacity would be sufficient until 1930 or longer. "The reduction in consumption which would undoubtedly be brought about by metering all services would not only postpone for ten or twelve years the necessity for construction of new water works at an estimated cost of \$12,000,000, but would also distribute the cost of extensions and improvements necessary to bring the existing works to

their ultimate capacity, over an additional period of ten years, resulting in a total net saving of at least \$5,000,000 to the city of St. Louis.

"Should the proposition to begin the general installation of meters this year be rejected, then the scheme of building new water works on the Missouri river should be at once taken up by the Board of Public Service."

## Comparison of High Duty and Centrifugal Pumps

In planning for increasing the pumping capacity of the St. Louis water works, L. A. Day calculated the comparative cost, under local conditions, of triple-expansion fly-wheel pumps and turbine-driven centrifugal, and decided that the former would be the cheaper. His calculation is given in this article.

The pumping plant at the Bissell's Point station of the St. Louis water works will need to be increased in capacity, and in studying the problem, L. A. Day, engineer in charge of the Operating Section, made a comparison between the triple-expansion crank and fly-wheel type of pump and the turbine-driven centrifugal type. His comparison is given below.

The total charges per year would comprise annuity or sinking fund, interest, repairs and maintenance, and the cost of producing steam (labor and materials). Three combinations of pumping units were considered, each of which would produce 130 million gallons additional capacity. These combinations were: 20, 20, 30, 30, 30, m.g.d.; 30, 20, 30, 20, 30 m.g.d.; 40, 40, 20, 30 m.g.d.

The costs of the respective units were taken as follows, these including \$1,000 for the foundation of each triple expansion pump and \$3,000 for the foundation of each centrifugal pump:

20 m.g.d.—triple expansion,	\$261,000;	centrifugal,	\$73,000
30 m.g.d.—triple expansion,	292,000;	centrifugal,	85,000
40 m.g.d.—triple expansion,	306,000;	centrifugal,	103,000

To determine the steam consumptions, the maximum duties were taken as follows:

20 m.g.d., Triple.....	200 mil. ft. lbs. per 1,000 lbs. steam.
30 m.g.d., Triple.....	206 mil. ft. lbs. per 1,000 lbs. steam.
40 m.g.d., Triple.....	206 mil. ft. lbs. per 1,000 lbs. steam.
20 m.g.d., Centrifugal.....	145 mil. ft. lbs. per 1,000 lbs. steam.
30 m.g.d., Centrifugal.....	153 mil. ft. lbs. per 1,000 lbs. steam.
40 m.g.d., Centrifugal.....	160 mil. ft. lbs. per 1,000 lbs. steam.

The engines at Bissell's Point operate normally at 90 per cent rating; accordingly all economic comparisons are made at 90 per cent rating. From tests, the duties at this rating are, for the triples 98.5 per cent, and for the centrifugals 97.5 per cent of the maximum duties.

All comparisons were reduced to a common period of 35 years, the assumed life of a triple expansion pump. The running time of the pumps over this period was determined from the ratios of consumptions to normal pumping capacities, assuming all pumps to run in rotation and for equal periods of time. For the Bissell's Point service, which is on a reservoir, the pumps always run at normal rating, making the load distribution proportionate to the running periods. The average running hours per year, thus determined are:

for the first installed 20 m.g.d. pump,	6,200 hours,
for the first installed 30 m.g.d. pump,	6,300 hours,
for the first installed 40 m.g.d. pump,	6,100 hours.

These values agree well with past practice.

Pumps delivering into a reservoir service have no daily peak to meet, and consequently require less total pumping capacity and have longer running hours per pump than would be required of the pumps of a closed service.

Applying the above figures results in the following table:

	COST PER YEAR. Steam per Hour, lbs.	50c p. 1,000 lbs.	30c p. 1,000 lbs.	Repairs and Maintenance
20 m.g.d., Triple.....	6,670	\$20,700	\$12,400	\$800
30 m.g.d., Triple.....	9,700	30,600	18,400	800
40 m.g.d., Triple.....	12,900	39,500	23,700	800
20 m.g.d., Centrifugal....	9,280	28,800	17,300	250
30 m.g.d., Centrifugal....	13,200	41,000	25,000	300
40 m.g.d., Centrifugal....	16,850	51,400	30,800	350

The maximum of 50 cents, and the minimum of 30 cents, were chosen as representing the cost of producing 1,000 pounds of steam, during and previous to the war period, at the Bissell's Point station.

According to the American Water Works Association Report of Committee on Depreciation, the probable useful life of "high duty large units" is 35 to 60 years, whereas, that of "centrifugal geared" is 15 to 25 years. Assuming the minimum 35 years for the triple and the mean 20 years for the centrifugal, results in the following annual costs:

Annuity .....	1.36 per cent for Triple,	3.36 per cent for Centrifugal.
Interest .....	5.0 per cent for Triple,	5.0 per cent for Centrifugal.
Fixed Charges....	6.36 per cent for Triple,	8.36 per cent for Centrifugal.

	COSTS		FIXED CHARGES	
	Triple	1.75* x Centrifugal	Triple	Centrifugal
20 m.g.d.....	\$261,000	\$126,000	\$16,600	\$10,500
30 m.g.d.....	292,000	147,000	18,600	12,300
40 m.g.d.....	306,000	178,000	19,500	14,900
* 35 years				
<u>20 years</u>	= 1.75; 1.75 x 70,000 + 3,000 = \$126,000.			

A summary of the total charges follows:

For 20 m.g.d.:	50c steam	30c steam
Triple .....	\$38,100	\$29,800
Centrifugal .....	39,600	28,000
For 30 m.g.d.:		
Triple .....	\$50,000	\$37,800
Centrifugal .....	54,200	37,600
For 40 m.g.d.:		
Triple .....	\$59,800	\$44,000
Centrifugal .....	66,700	46,000

Assuming that the cost of steam in the future will not drop much below 40 cents per thousand pounds, it was calculated that in every case the total cost per year of the triple would be lower than that of the centrifugal of equal capacity.

The desirable pump to install is obviously the 40 m.g.d. triple, which has the lowest average cost for pumping per million gallons of water and which occupies no larger floor space than any of the others considered, thus providing the greatest capacity for the available space and postponing further the time when new building will be required. This would run the least number of average hours per year and give the longest period of relief.

## Sewering War-time Housing Developments

In the previous issue were set forth the methods employed in designing and constructing sewerage systems for the several services. In this one the methods of treating the sewage are described. In the Emergency Housing Projects a modification of the Doten tank was used. At a majority of the aviation fields the Imhoff tank was used, followed by chlorine disinfection in two-thirds of them. Construction and operation details are given.

### SEWAGE TREATMENT.

**Emergency Housing Projects.**—It was necessary to treat the sewage in only a few of the emergency housing projects, namely those at Hilton Village, Va., Dundall, Md., Yorkship Village, N. J., Groton, Conn., and a chlorinating plant at Port Jefferson, L. I.

The question of type of plant best suited to meet the exigencies of a war emergency was carefully considered, and it was finally determined that the requirements would best be met by a simple form of tank treatment, whereby the settleable solids might be removed from the sewage, with provision, where necessary, to properly disinfect the effluent.

In view of the fact that such works had to be constructed with the greatest possible speed, it was imperative that the type of tank adopted be one that could be built easily and quickly. This, together with the fact that simplicity of operation was important, resulted in rejecting the Imhoff type of tank. Under the most favorable conditions the Imhoff tank is not only the most expensive and difficult of all tanks to build, but it is also the most difficult to operate successfully. For small developments, where the sewage reaches the treatment

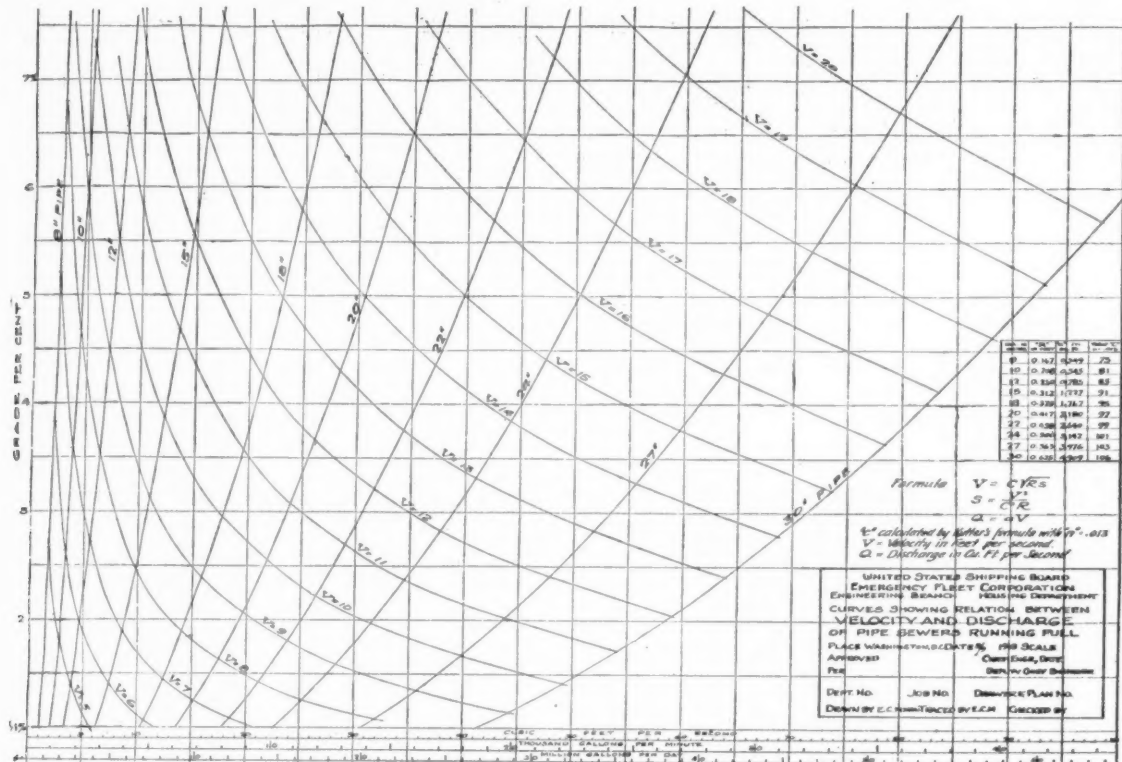
works in a comparatively fresh state, the use of the Imhoff type of tank was considered inadvisable. Furthermore, the Imhoff tank requires at least six months before it can be expected to operate efficiently and is never free from the danger of "frothing."

The tank recommended by Major L. S. Doten, of the Construction Division of the War Department, for use at the various army camps was studied. Major Doten, in his original design, recommended a capacity for the tank equivalent to 10 gallons per capita served. This capacity has been found inadequate and it should be at least double the original recommendation. It was originally purported that the tank would meet the requirements of sewage treatment at the army camps without any further treatment, that the sludge would be digested by septic action and that the effluent could be discharged into a stream without nuisance. The early reports relative to the operation of the Doten tank at the various cantonments were very discouraging. The department's sewage treatment expert, Geo. T. Hammond, visited many of the plants after they had been placed in operation and had an excellent opportunity to see the conditions under which they were working. He found that in

most cases they were excessively overloaded and entirely too small to bear the burden placed upon them. The sewage was extremely difficult to treat, as the amount of suspended matter was unusually large and it also carried a very high percentage of fats. Much trouble was experienced from scum, caused mostly by the grease which formed about the floating solids and collected at the surface of the tank, forming a thick mat which, being removed, had to be buried in trenches to prevent nuisance. The scum was especially troublesome in the

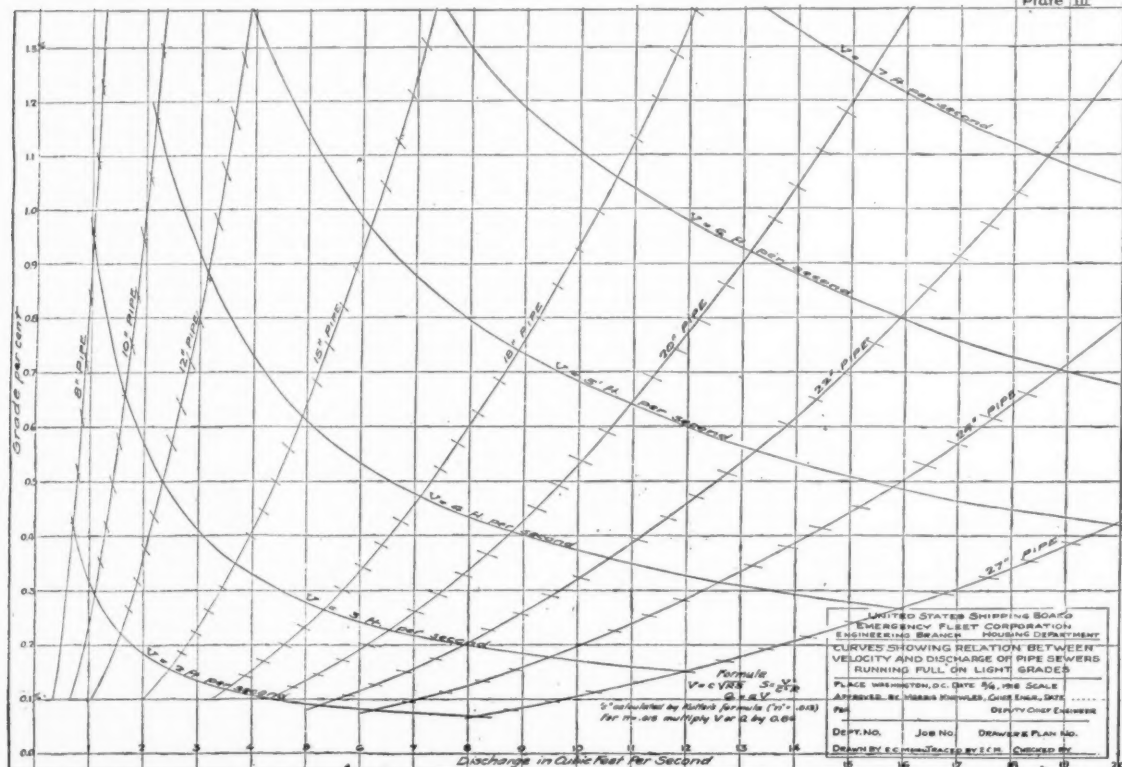
first compartment of the tank, where it developed its greatest thickness, reaching in some cases to within two feet of the top of the hoppers. The thickness of the scum decreased in the three remaining compartments, being the least in the outlet compartment. The formation of scum greatly reduced the effective cross section of the tank and the sewage passed through so rapidly that the effluent was highly putrescible and caused a nuisance.

However, Mr. Hammond was forced to conclude that



DISCHARGE AND VELOCITY OF PIPE SEWERS RUNNING FULL—HEAVY GRADES.

Plate III



DISCHARGE AND VELOCITY OF PIPE SEWERS RUNNING FULL—LIGHT GRADES.

an Imhoff tank working under the existing conditions would have given equally unfavorable results. Had arrangements been provided for properly removing the grease and had the tanks not been so excessively overloaded the results, no doubt, would have been far different.

*Type of Tank Adopted.*—The type of tank adopted for the developments, where treatment was considered necessary, was a modification of the so-called **Doten tank**. The capacity was increased to provide 20 gallons per capita served.

The tanks were designed so as to give sufficient sectional area from an elevation one foot below the bottom of the baffles, with due allowance for scum, to allow for a retention period of two hours. The tanks were usually built in parallel units. When the sludge reached an elevation of one foot below the bottom of the baffles in the first compartment the tank would be thrown out of active service and the parallel unit would then perform the functions of sedimentation, allowing the sludge in the first unit to remain in the hoppers with the expectation that septic action would develop therein and prepare the sludge for disposition on the drying beds.

In operating these tanks, it must be borne in mind that the tank is primarily for sedimentation, and very little, if any, digestion of the sludge can be effected while the tank is active. To what extent digestive action may take place during the period of rest is yet to be determined.

Care should be exercised to control any odors which arise during operation or during the period of rest. In case of odor emanating from the storage side, the sewage in the outlet compartment should be tested with litmus to determine if acid or alkaline. If acid, add a rather dilute milk of lime in the receiving chamber and pass with the sewage through the tank, allowing it to flow no longer than necessary to reduce acid condition. It will only be necessary to permit the sewage to flow

for a sufficient length of time to pass the milk of lime into the first compartment. The milk of lime can be added to the second and third compartments by distribution over the surface, adding the milk of lime until an alkaline reaction is obtained. Should odor come from the surface scum, the surface scum should be sprinkled with the West disinfectant, which will reduce the odor and will kill any larvae which may be present. The West disinfectant should be mixed with the proportions of about two ounces of disinfectant per gallon of water. If the West disinfectant is not obtainable, sprinkle with saturated solution of hypochlorite (about 5 per cent) or one pound of hypochlorite to twenty pounds of water.

The odor of sulphureted hydrogen, escaping from the plant, may be controlled by placing powdered hypochlorite, about four pounds per dose in galvanized pails placed on the walls of the tank near the ventilators, the same to be renewed daily.

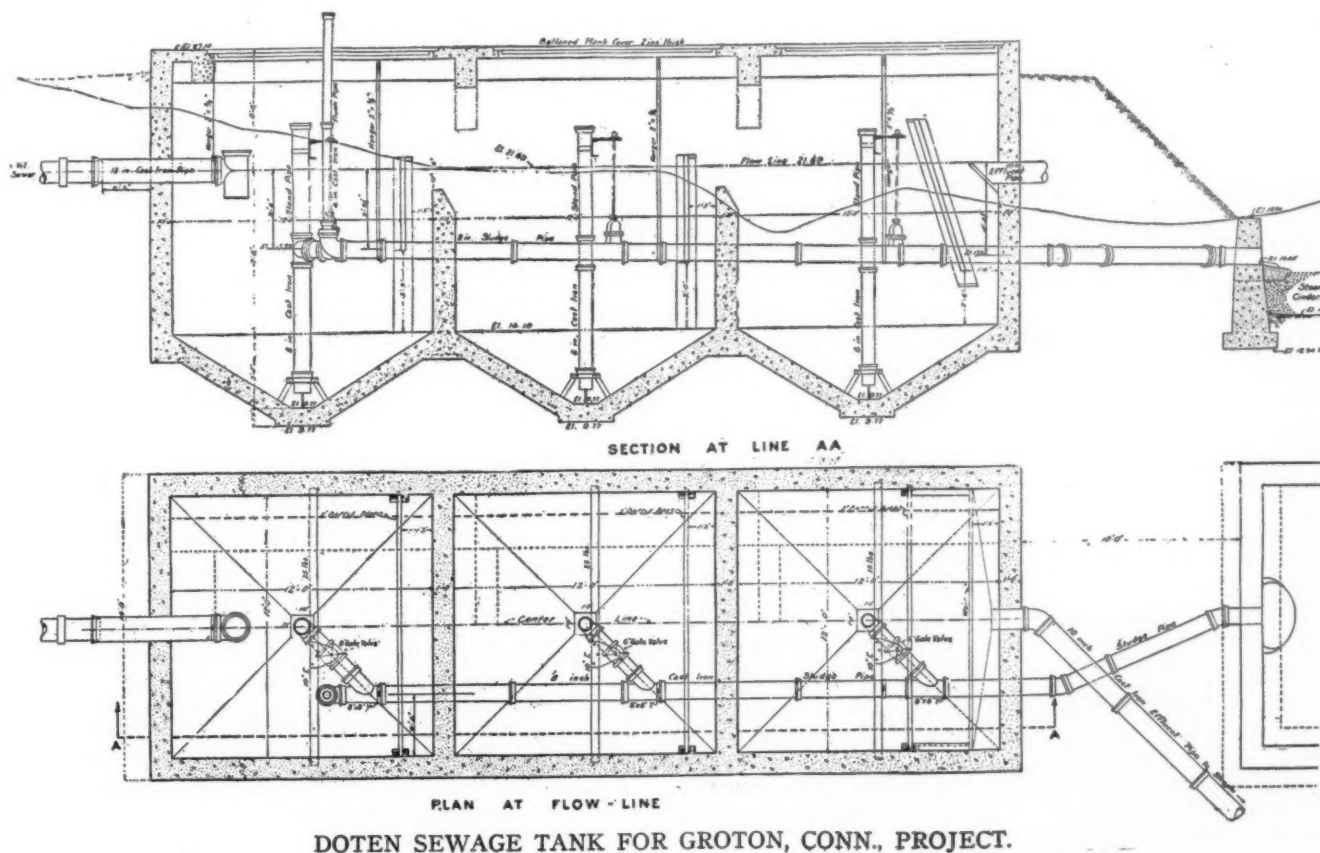
In case of odors in the operating side, the foregoing measures also should be taken.

If, at any time, odors become uncontrollable, the tanks should be cleared out, milk of lime being used and the deodorants applied.

*Aviation Fields.*—Sewage treatment plants were also constructed at the several aviation fields and posts. Imhoff tanks were installed at eighteen of the thirty, and septic tanks at the remaining twelve. Many of the Imhoff tanks were covered with screens which greatly aided in reducing the fly nuisance. At only one field was the Doten tank installed. It did not appear necessary to provide sewage screens and detritus chambers except in connection with pumping units.

In the summer of 1918 the engineering section, supply divisions of the Department of Military Aeronautics, formulated the following general rules for the design of sewage treatment plants:

Imhoff Tanks. (a) Sedimentation chamber: flow, 87 gallons per capita; flow takes place in 16.5 hours; normal



detention period, 2 hours. (b) Sludge digestion chamber: 0.102 cubic yard per person.

Septic tanks. Normal detention period, 8 hours.

Filters. (a) Sand filters: 1200 persons per acre installed. (b) Sprinkling filters: 200,000 gallons per acre per foot effective filter depth. At 87 gallons per capita per day this equals 2300 persons per acre per foot effective filter depth. (c) Contact beds: 70,000 gallons per acre per foot effective depth. At 87 gallons per capita per day this equals 800 persons per acre per foot.

Other things being equal, we recommend the adoption of Imhoff tanks and sprinkling filters, with subsequent chlorination if deemed necessary.

Regarding per capita flow: We quote 87 gallons as being the minimum. However, if it is known that the per capita daily flow will be more than this, it should be determined as nearly as possible and be made amply large.

Minimum grades for sewers are quoted:

Size of pipe	Grade in feet per 100
6 inches	0.6
8 inches	0.4
10 inches	0.3
12 inches	0.22

*Imhoff tanks versus septic tanks.*—At the aviation fields the problem of the relative expense of the Imhoff tank and the Doten septic tank was not seriously considered, with the result that a majority of the plants were equipped with Imhoff tanks. In general the Imhoff tank gave a higher degree of clarification than the plain septic tank and turned out a better digested sludge.

Imhoff tanks embracing the following features gave the best results: (a) Longitudinal flow; (b) but one flowing-through or settling compartment over each sludge digestion chamber; (c) settling compartment with steep sloping sides, not less than 1:1; (d) with sufficient overlap of sides of settling compartment at slots to insure the complete deflection of the rising gas to the gas vents; (e) with retention period in the settling compartment of between 2 and 3.5 hours; (f) with sludge storage capacity sufficient to insure at least 6 months storage; (g) with gas vent area from 20 to 25 per cent of total tank area.

The relative efficiency of deep and shallow sludge digestion compartments was not determined, although shallow tanks with large sludge digestion capacity have operated as satisfactorily as the deeper ones.

Twenty of the 30 sewage treatment plants used chlorine for disinfection of the treatment plant effluent. The flow of chlorine gas, where liquid chlorine was used, was regulated in all but three or four cases by manual-control machines. It appears to be better practice, at a plant with intermittent sewage discharge due to the use of intermittent filtration units, to use a manual control chlorinator resulting in overdosing the sewage at times of low flow, rather than to experience the difficulty with an automatic control chlorinator in dosing widely varying rates of flow. The necessity of intelligent supervision and skillful operation of chlorine machines cannot be overemphasized, as chlorine apparatus is by no means fool-proof.

Sewage plant effluents were generally of as good a quality as the water of the streams into which they were discharged.

The outstanding feature of aviation water supplies and sewage disposal systems is the need for skilled operators. A skilled intelligent operator, whether he be the plant attendant or an advisory engineer, chemist or operator, who can make occasional inspections, can often obtain excellent operating results from a poorly designed plant and certainly can do so much better from a well designed one.

The engineering section of the Supply Division sent to each camp, in the fall of 1918, a set of "Instructions for the Operation of Sewage Disposal Plants at Aviation

Schools." This paper included recommendations for the operation of Imhoff tanks, septic tanks, sprinkling or trickling filters, sand filters, contact beds, screens, and chlorine dosing apparatus. It also included directions in regard to measurements of sewage flow and methods of sampling and testing sewage. Such instructions undoubtedly aid in the operations of a treatment plant, but successful operation will always depend, in the final analysis, on the intelligent and careful control by a skilled operator. It may not be necessary to have this skilled operator in immediate control of the plant operation, but he must give constant advice and regular attention. The engineer section commissioned one such man to travel from plant to plant making recommendations on plant operation and also making chemical and bacterial analyses of the sewage. The territory covered was necessarily limited because of the time required, but many advantages obtained from the use of this man were apparent.

## LARCENY OF WATER, GAS AND ELECTRICITY.

By John Simpson.

Examination of court decisions in the various states shows that these may be the subject of larceny, whether ownership is private or municipal, whether or not pipe is on consumer's premises; and that a municipality can sue for value of water and gas taken.

It is clear, from the decided cases, that water and gas in pipes may be the subject of larceny. Electricity, too, according to the only decided case in this country bearing directly on the subject, may be the subject of larceny.

### LARCENY OF WATER.

With regard to the theft of water stored in pipes, the earliest of the cases on the subject is the English case of *Ferens v. O'Brien* (1883) 11 Q. B. D. 21, 52 L. J. Mag. Cas. 70, 31 W. R. 643, 15 Cox C. C. 332, 47 J. P. 472. In this case it appeared that a colliery, located so far away as to be out of the district supplied by a water company operating in a neighboring town, laid its own pipes for a mile to a point where the water company placed its meter. The colliery owners then put branch pipes into the houses at the colliery, to which taps were attached, allowing the workmen to take the water from the taps on paying a certain fixed sum. A woman, in spite of the warning of the manager of the colliery, took away two buckets of water from a tap within the colliery without paying for it. The justices having refused to convict, a question was stated to the court, "Is water the subject of larceny at common law?" It was held that there was nothing in the English statutes (the Waterworks Clauses Acts), containing clauses enacting penalties for the abstraction of water from a company's mains or pipes without agreement with the company, to prevent water in pipes belonging to a water company being the subject of larceny at common law. It is to be noted that the complainants here were, not the water company, but the colliery owners, who had bought and owned the water.

### TAPPING OUTSIDE METER.

The most common and obvious method of illegally getting possession of water in pipes is doubtless by tap-

ping the pipes before the water reaches the meter. A municipal corporation authorized by law to maintain waterworks and furnish water to private consumers sued a tanning company for the value of water alleged to have been wrongfully taken from the city's water mains to the amount of over 8,000,000 cubic feet during a period of eight years. The defendant demurred to the complaint on the ground that the city had no authority to sue. It was held, *Milwaukee v. Herman Zoehrlant Leather Co.* (1902) 114 Wis. 276, that the demurrer was properly overruled. The court said: "This is an action to recover the value of 'stolen waters.' Whether they were sweet or not does not appear, but it is distinctly charged that they are the property of the city in its mains, and that they were clandestinely appropriated by the defendant to its own use, and have never been paid for. If the water alleged to have been taken belonged to an individual or a private corporation authorized to deal in water, we apprehend there would be no question raised as to the right of recovery. The fact that the plaintiff is a municipal corporation cannot logically affect the right to recover, so long as it is endowed by law with the power to maintain waterworks and furnish water to private consumers. The water in its pipes is property, it belongs to the city, it is of some value, and it is charged to have been taken by the defendant and never paid for. This makes a complete case, on very well established legal principles." The fact that the city had established water rates and was empowered to collect them from consumers did not affect the right to recover the value of water taken in defiance of the city's regulations. That method of payment was primarily intended for water sold by the city to consumers according to its rules. Granting that it might also be used to recover for water clandestinely taken and converted, it does not exclude the previously existing common law remedy by an action for conversion.

#### CONNECTING ONTO NEIGHBOR'S SERVICE.

In *Rex v. Hutton* (1911) 24 Canadian Crim. Cas. 212, it was held, following *Ferens v. O'Brien* supra, that where water was deliberately taken from the pipes through which an adjoining property owner got his water supply from the city at a flat rate, after the refusal of permission from such owner and without any permission from the city, the person wrongfully appropriating the water is properly convicted on a charge alleging the theft thereof from the city. The court considered the question to whom the property was vested to be somewhat difficult, and thought, if it were a case of a meter, and the water was taken from the consumer after it had passed through the meter, it would be the property of the consumer; but where, as here, the water was supplied on a flat rate, the water was still the property of the city corporation.

#### BY-PASSING METER.

The most recent case on the subject of the larceny of water in pipes is *Clark v. Oklahoma* (1918) 14 Okla. Crim. Rep. 284, 170 Pac. 275, an appeal from a judgment of conviction of petit larceny of one of the managers of an ice and fuel company by causing a pipe to be attached to a water pipe belonging to the city of New Cordell by means of which the water was diverted so that it flowed around the consumer's meter into its plant and was appropriated without payment.

The ingenious contention was made that, by reason of the provisions of the Oklahoma Statute (article 4, c. 10, Rev. Laws 1910), a city or town acquires no owner-

ship in the water which it may impound in its pipes for the purpose of distribution to consumers, but that only a privilege is created which permits the city to acquire by condemnation, purchase, rental, lease, etc., certain lands or water districts from which a supply of water may be obtained for distribution to consumers under fixed rates or taxes, and that if a person taps the mains or pipes in which the city has impounded its waters and diverts it to a use for which the city did not intend it, or diverts it so that it would not pass through a regular meter which the city uses for the purpose of measurement, the person so diverting the water and converting it to his own use without the knowledge and consent of the city has only deprived the city of its regular charge or taxes, and is not guilty of stealing its property.

The court did not agree with this contention. The fact that the state has seen fit to permit a city or town to establish a waterworks system, and to serve the citizens with water for private consumption, charging a fixed rate for such service, does not change the water, which the city has taken into its possession and under its control by impounding it within the confines of its mains and pipes, of its character as property. That water so confined is personal property, capable of ownership, cannot be disputed. The courts have so held practically without dissent. Running water has often been compared to wild animals, bird and fishes, which, before capture and confinement, belong to no one, but after capture belong to him who captures them.

Another contention was that, after water had passed into the ice plant from the city mains, the city had no claim of ownership in it, and the defendant might use it as he chose. It was held that the facts did not support this argument. The city had contracted to supply the company with water at a certain meter rate. It had connected its main with the company's place of business by a pipe which ran through a meter, and only surrendered possession of the water to the consumer so long as it was measured in accordance with the contract. The city did not part with possession of the water until after it had passed through the meter. When the defendant, by means of the trick of placing a pipe in front of the meter to run around it and connect with the pipe behind the meter, shut off the cock in front of the meter so that water could not run through the same, he obtained possession of the city's water by fraud and stealth, and could not maintain that the city parted with the possession and ownership of its water voluntarily.

#### LARCENY OF GAS.

The principles applied in the above-mentioned cases relating to water have also been consistently applied in the case of gas in pipes, which at common law has always been held to be the subject of larceny. In *Commonwealth v. Shaw* (1862) 4 Allen (Mass.) 308, it appeared that on a consumer's failure to pay for gas, the company removed her meter and closed the service by means of a stopcock outside the house. The consumer afterwards removed the stopcock and connected the service pipe with the pipes inside the house by means of a lead pipe. The consumer was held guilty of larceny. Gas is a valuable article of merchandise, capable of being bought and sold like other personal property, of being severed from a mass of larger quantity, and transported from place to place. There is nothing in its nature which renders it incapable of being feloniously taken and carried away. The defendant severed a portion of that

which was in a pipe of the company by taking it into her house and there consuming it. All this, being proved to have been done by her secretly, and with an intent to deprive the company of their property and to appropriate it to her own use, clearly constituted the crime of larceny. It was also held that the fact that the service pipe was on the consumer's premises did not constitute such an intrusting of the gas to her possession as would render the offense embezzlement and not larceny. In this the court followed *Reg. v. White* (1853) 3 Car. & K. (Eng.) 363, 22 L. J. Mag. Cas. 123, 6 Cox C. C. 213, 17 Jur. 536, 1 W. R. 418. In that case it appeared that the defendant owned the entrance pipe by which the gas was admitted to the meter and also the exit pipe by which it passed from the meter to his burner. Having control of the stopcock by which the gas was admitted into the meter he inserted a connecting pipe around the meter and thus appropriated gas without paying for it. It was contended that as he owned the entrance pipe he was lawfully in possession of the gas by the company's consent as soon as it entered that pipe from the gas main. It was held, however, that although the gas was in a pipe belonging to the consumer, it was still in the gas company's possession until it passed through the meter; and causing the gas to pass through the connecting pipe, thereby separating it from the gas in the entrance pipe, was a sufficient transportation, or carrying away, to sustain a conviction of larceny if the taking was with fraudulent intent.

In *State v. Wellman* (1885) 34 Minn. 221, N. W. 395 it appeared that after the gas company had removed its meter from a dwelling house and closed the service pipe by a stopcock, a boarder at the house connected the service pipe by means of a lead pipe he bought for the purpose with the fixtures in the house so as to use the gas without metering and without the company's knowledge.

It was held that, while the larceny would not be consummated until the final act of turning the gas on and lighting it at the burners, the person who procured the lead pipe with knowledge of its use would be equally guilty with the persons who made the connection and turned on the gas. It was no defense that the gas was taken for the use of another.

As in the case of water, in *Ferens v. O'Brien*, so with gas, in *Reg. v. Mitchell*, 22 Gas. J. 137, it was held no defense that the amount taken was insignificant, and a sentence of one month's imprisonment for larceny was imposed.

#### ELECTRIC CURRENT.

In *United States v. Carlos* (1911) 21 Philipp. 553, the Supreme Court of the Philippine Islands holds that one to whom an electric light company furnishes electric current for lighting purposes, and who, by means of a "juniper," uses electricity which does not pass through the meter installed for the purpose of measuring the current used, thus depriving the company of such electric current, is guilty of larceny.

#### SUMMARY OF DECISIONS.

From the reported decisions on the subject, therefore, the following conclusions may safely be arrived at: (1) That gas and water, and probably electricity, may be the subject of larceny; (2) that the fact that the owner of the article is a municipal corporation is immaterial; (3) that the theft may be from the one who purchases from the corporation supplying the commodity; (4) that the amount abstracted is immaterial; (5) that it is immaterial that the pipe from which the commodity is abstracted is on the consumer's premises; (6) that the commodity need not be taken for the taker's own use

to constitute larceny; (7) that a municipal corporation has authority to sue in a civil action for the value of water or gas wrongfully taken; (8) the existence of statutes and ordinances imposing penalties for the interference with pipes and taking of gas, water and electricity does not affect the common law liability; (9) the fact that a city owning the water system collected water rates therefor is immaterial.

## Blasting Down Highway Banks

Where high banks in highway cuts need to be carried or sloped back, the use of dynamite has been found advantageous in Iowa, rather than picking by hand or rooters drawn by teams. Concerning this, M. C. Potter, of Bellevue, Iowa, gives the following information:

In most cases, stumps are encountered on top of the banks and gravel or small boulders interspersed through them. The boulders and the roots make it difficult and often impossible for the teams to pull the rooters and the breaking of machinery or harness and the injury of the horses is of frequent occurrence.

We have found that by putting down holes vertically in the top of the banks, locating them 3 to 5 feet back from the face and loading them with a few cartridges of dynamite (the size of the charge depending upon the depth of holes and distance back from face) much time and labor is saved. The banks are thrown down into the roadway in loosened condition ready to be loaded onto the wagons, or in shape to be drawn away in scrapers and used for fills. I have known of cases where dynamite has thrown down as much dirt, as a result of twenty minutes' work putting down and loading holes, as teams and rooters could remove in a day, and at a cost much less than team and labor hire would amount to.

Even when a steam shovel is used, we have found it to be economical to use dynamite in loosening banks because the steam shovels are enabled to operate much faster on the loosened soil.

## Sewer Maintenance in Chicago

The latest annual report of Geo. E. McGrath, superintendent of the Bureau of Sewers of Chicago, shows 5,702,900 feet of sewer flushed at a cost of 61 cents per hundred feet; 379,800 feet scraped at a cost of \$10.27 per hundred feet; 12,919 catch-basin cleanings by hand at an average cost of \$2.98 per cleaning; and 22,505 catch-basin cleanings by machine (auto-eductor) at an average cost of \$1.65. The last cost includes salaries and wages, gasoline and lubricants, repairs and miscellaneous, 10 cents a mile for depreciation and 4 per cent interest. The seven machines traveled 22,590 miles, giving \$2,259 depreciation, or about 6.4 per cent.

The sewerage system comprises 3,971,308 feet of brick and concrete sewers; 9,237,997 feet of vitrified pipe; 122,985 catch-basins (less than a quarter of which were cleaned during the year); and 93,584 manholes.

The bureau maintains a system of bench marks and bench monuments throughout the city referred to city datum within the limits of precise leveling. It examines and submits to the city council all street grades and keeps public records of such grades after their establishment by ordinance. It examines all street grades contained in improvement ordinances. During the year 36.5 miles of precise levels were run, 15 standard and 12 sub-standard bench monuments built and 56 ordinary bench marks established.

# The WEEK'S NEWS

May Change New York State Highway Finance Policy—Progress of Indiana Highway Commission—U. S. Public Health Service Calls Conference on National Health Conservation—Scranton Plans Street Lighting with Garbage Fuel—Boise Fire Department Issues Educational Bulletins—New York City Transit Lines Carry Two Billion Passengers—Motor Truck Regulation on Pennsylvania Highways—St. Paul Proposes City Planning.

## ROADS AND PAVEMENTS

### Boston Common Cut to Widen Streets.

Boston, Mass.—The "slicing" of Boston Common to permit the widening of Tremont and Boylston streets for the relief of traffic congestion was sanctioned by the voters in the municipal election. The vote stood as follows: For the widening of Tremont street: Yes, 23,414; No, 16,101. For Boylston street: Yes, 23,300; No, 15,859. Only small portion of the malls on these two sides of the Common will be thrown into the streets, each of which will thus gain a uniform width of forty-three feet. The vote was surprising, the referenda carrying all but two of the 26 wards. Four years ago there were three such propositions, embracing Tremont, Boylston and Park streets. There was very little agitation. This year Park street was eliminated, the plans for Tremont and Boylston streets were reduced to a minimum and an agreement entered into between the Boston Common Society and the city authorities by which no further invasion of the Common would be tolerated.

### May Adopt "Pay-As-You-Go" Policy for Roads.

Albany, N. Y.—The state may substitute the "pay-as-you-go" plan to defray the cost of highway construction and other permanent improvements for the present system of providing for expenditures of that character through long-term bonds. Speaker Thaddeus C. Sweet of the assembly, stated that at a recent conference held to discuss the ways and means for more highway construction, the proposal had been received with considerable favor. "Every time we float a \$100,000,000 bond issue it means the expenditure of \$190,000,000 before amortization," said the Speaker. "I the conference agreed with me that it would be cheaper do not know what we will do. Many of those who attended for the taxpayers urged us to pay as we go along, and we may come to that." At the conference there was much discussion on the subject. Some were in favor of the bond issue and some were in favor of including in the annual tax budgets the sum required for the construction and maintenance of state and county highways, and a larger number were in favor of a short term serial bond issue which would be a sort of a compromise between the strictly pay as you go proposition and the 30 or 50 year bond issue. Some agreed with the highway superintendents that the very expensive type of concrete pavement costing \$40.00 a mile should be continued, while others favored a greater mileage and a cheaper road at less cost. Others believed that part of the state funds should be made available for building county roads under Section 320-A in the several counties. This method of construction is popular in some portions of the state. The proposed system of state and of state and county highways contains approximately 12,150 miles, of which 8,844 miles have been constructed and 3,306 miles have not yet been built. The state has heretofore authorized two bond issues of \$50,000,000 each. All of this money has been spent, except \$10,000,000. Commencing with 1921, the state will have no bonds with which to construct the balance of the highway system. Although, by 1920, the \$100,000,000 authorized by the old bonds issues will have been exhausted, the bonds themselves will still have a quarter of a century to run and, during that whole period, the annual charge for interest

and amortization on these two old issues will be \$7,000,000.

Superintendent Greene's policy is to build durable roads. Former superintendent Duffy spoke at the conference in favor of cheaper roads. State superintendent Greene estimated that, aside from building new roads, it would cost \$36,000,000 to put existing highways in good condition, or an average of \$4,861 per mile, although the maintenance cost on a modern concrete road is not more than \$75 per mile. Reasons given for present high costs were: 1. Advanced cost of labor and material; 2. Increased traffic, speed and weight; 3. Old highways not designed for modern traffic; 4. Insufficient maintenance fund in past years; 5. Virtually no reconstruction through the war years, 1917 and 1918; 6. Increased age and mileage of roads.

### Work of Indiana Highway Commission.

Indianapolis, Ind.—L. H. Wright, director for the state highway commission, has prepared a review of the operations of the new state highway commission for the state fiscal year ending September 30. Detailed accounts of the commission's financial affairs, construction work, various bureaus, motor truck department and the like are contained in the report. While the period covered in the report begins in April the commission actually did not get down to business until late in May and only recently some of the departments have got under way. In writing of the work the commission has undertaken and is hoping to undertake, Mr. Wright says: "The auditor's report shows that we have under contract for construction, 133 miles of road. We had planned for the construction of at least 400 miles of hard surface road during 1920 and we have our surveys and a part of the plans and specifications worked up. But we find that the 133 miles which we have under contract will take up all of our available funds. The people throughout the state are demanding that each piece of road through their especial communities be constructed at once. The sentiment throughout the state would seem to recommend that a greater appropriation be made to this department in order that the system laid out may be completed in the shortest time practicable."

The report shows that the 133 miles are to be constructed at a cost of \$4,739,238.36, or an average of \$35,633.37 a mile. The federal government pays half the cost. A statement accompanying the report shows the total expenditures at \$116,020.87, and a balance of \$1,145,609.34, of which \$38,541.66 is in the office and administration fund.

Itemized, the total expenditures are as follows: Administration, \$7,217.86, including commissioners' and director's salary and expenses; office, \$4,240.80, including bookkeepers' and stenographers' salaries general office expenses and new furniture for equipment; general engineering, \$10,713.07, including salaries of engineers, expenses, new equipment and the like; construction, \$9,181.87, including contract payments on federal aid projects; inspection and construction engineering, \$17,327.44, including salaries and expenses of the inspectors on federal and county aid projects; bridges, \$8,627.56, including salaries and expenses of engineers; project engineering, \$26,303.85, including salaries and expenses; motor transport, \$27,363.74, including expenses, and \$18,304 for new bodies for the skeleton trucks received as gifts from the government. The remaining \$5,000 of the sum listed as total expenditures is a revolving fund for the use of the commission.

A special report covers the motor transport department and shows the lending to eighteen state institutions or departments of 58 trucks; the renting to eight contractors of 31 trucks; the number of trucks in storage and the number in use by the commission, all of which total 296. Of the thirty automobiles used by the commission itself, four were inherited from the old commission and three were obtained by trading two government trucks for them.

Graphs show the organization plan of the commission and how its various departments and bureaus are related to one another. Completed surveys by the commission include 308

miles of road. Completed plans and specifications cover 192 miles. Work now under way includes surveys and specifications for approximately 300 miles.

The bridge bureau has completed plans and specifications for \$39,700 worth of bridges and these plans and specifications have been approved by the federal government. Plans and specifications completed, but not yet approved, cover \$71,700 worth of bridges.

The bureau of county aid shows seventeen roads built by counties and superintendents, on petition, by the bureau. The mileage was thirty-two and the estimated cost \$968,786.83. Of this work the report states: "The law makes it mandatory for the commission to superintend the construction of all roads on which such inspection is asked. The law does not, however, give the commission the right to insist on adequate and proper specifications. The supervision of the commission usually is asked after the plans and specifications have been prepared and the contracts let. The commission therefore has no voice in the preparation of these plans and specifications but is expected to secure the proper construction under the specifications prepared by the county. We believe the law should be amended so as to give the commission a chance to approve the plans and specifications if it is to be asked to superintend the construction." The report concludes with the statement: "It is hoped that in the near future we will be able to establish a testing laboratory for all materials entering into road construction and such research work as may be necessary." The commission now is having much of the testing done at Purdue University.

## SEWERAGE AND SANITATION

### Nation-wide Conference on Health Conservation.

Washington, D. C.—In a letter sent recently by Surgeon General Blue of the United States Public Health Service to state and city health officers, to the head of the American Red Cross, the American Public Health Association, the American Medical Association, the National Tuberculosis Association, the International Health Commission, the National Safety Council, the American Child Hygiene Association, and other health agencies, the suggestion was made to hold a conference in Washington to consider a health program prepared by the Public Health Service. Practically all of these agencies have under consideration some plan of health conservation and unless the work can be co-ordinated and properly directed, little will be accomplished, and there will be much overlapping of effort and waste of funds. The response to the bureau's suggestion was most favorable. Accordingly a call has been issued designating January 26, 1920, as the date on which the conference will meet, and invitations have been extended to health officers, sanitarians, and representatives of important national health organizations to participate in its deliberations. According to a statement issued by the Public Health Service, "the public does not realize what has already been accomplished in the field of preventive medicine or what can be done by carefully executed health program which is cumulative and continuous rather than spasmodic and desultory in character. In 1900 the general death rate from all causes in the registration area of the United States was 17.6; in 1917, the latest period for which figures are available, it had been reduced to 14.2. Had the 1900 death rate prevailed in 1917, there would have been in the United States, with an estimated population of 110,000,000, 374,000 more deaths than actually occurred. The record of other years leaves little room to doubt what may be done in saving life. In 1900 typhoid fever caused a death rate of 35.9 per 100,000 population. In 1917 the rate had been reduced to 13.4. Diphtheria was reduced from 43.3 to 16.5 in the same period. Tuberculosis declined from 201.9 deaths per 100,000 of population in 1900 to 146.4 in 1917. Had the 1900 rate prevailed in typhoid fever, diphtheria and tuberculosis, in 1917 these three diseases alone would have caused 115,280 more deaths than actually occurred. The success of the plan will be determined largely by its direct applicability to the conditions in the different local communities, and for this reason Federal, State and local health

officers must co-operate most closely in order to direct the campaign in each community and set a definite object. For instance, a southern city would be more interested in a campaign against the mosquito and malaria than it would be in Rocky Mountain spotted fever. A northern industrial city would be more interested in the control of pneumonia and respiratory diseases. All, however, have cancer, tuberculosis and venereal diseases; all would be benefited by public health nursing, medical supervision of school children, conservation of the lives of mothers and children, adequate sewage disposal, the provision of pure water and pure milk. So, while each city and rural community will have as a definite objective the most vital need in that particular place, the various health agencies will have definite objectives according to the particular problem they set for themselves to solve. That the proposed health program of the Public Health Service is feasible is shown by the successful termination of the extra-cantonment work which was carried on so efficiently through the co-operative efforts of the American Red Cross, State and local health authorities, and the United States Public Health Service. The lesson taught by this splendid demonstration of team work should not be lost to the country. For this reason, the American Red Cross, which has set aside millions of dollars for health work in the United States, has been asked to take an active part in translating the health program into action. Its thousands of local chapters are counted on to arouse and maintain interest in health work and actively co-operate with Federal, State and local health officers in accordance with the announced policy of the American Red Cross to co-operate with existing health agencies."

### Exclusion of School Children with Trachoma Upheld.

Bismarck, N. D.—An order of a county board of health denying admission to school of children who had, or were suspected of having, trachoma, unless they were under treatment for the disease, has been upheld by the North Dakota Supreme Court (*Martin v. Craig et al.*, 173 N. W., 787). The plaintiff petitioned for a writ of mandamus to compel the admittance to school of two children. The defense was that reputable physicians, one of them an officer of the United States Public Health Service, had found one of the children to be affected with trachoma and suspected that the other child had the disease. Other physicians testified in behalf of the petitioner that the children did not have trachoma. It appeared that the disease was prevalent in the county, and that as a result of a survey made by the United States Public Health Service a Government hospital had been established in the county, where trachoma patients could receive free treatment. The lower court upheld the exclusion order and this action was affirmed by the appellate court. The supreme court stated in the opinion that "even conceding that it may be doubted in the instant case whether the children in question are affected, the doubt is one that must be resolved in favor of the authorities charged with the serious responsibility of preventing the spread of the disease. This is a case where mandamus does not issue as a matter of right, but where it will only issue in the exercise of a judicial discretion, and this discretion should not be exercised in a way that might result in needlessly exposing healthful children to a disease as serious as trachoma."

## STREET LIGHTING AND POWER

### Big Power Station for English City.

Nottingham, England.—A huge electric-power station, to cost £14,000,000 (approximately \$70,000,000), will be erected on the banks of the Trent River in Nottingham, if the recommendation of a special committee appointed to investigate the matter is adopted. This announcement has just been issued by the chairman of the city's electricity

committee. Some months ago the Government announced that there were to be super-power stations erected in different parts of the country, and since then the matter has been under consideration by persons interested in this particular section of the Midlands. Two well-known experts were appointed to deal with the matter from a technical standpoint, and their report was adopted at a meeting of the committee. The report advised that super-power station be erected on the banks of the Trent River at Nottingham to supply the whole area affected, which was 50 miles from north to south and 40 miles from east to west and contained 2,000 square miles, including the greater portions of the counties of Nottinghamshire, Staffordshire, Derbyshire, and Leicestershire. In this area there are 25 towns and cities each having over 10,000 inhabitants and the total number of inhabitants to be served is something like 5,000,000. It is proposed to erect the plant in two stages, the first intended to supply immediate demands and the second for rural districts later. The estimated cost of the first stage will be £5,250,000 (approximately \$26,250,000), while the entire plant when completed will represent an expenditure of £14,000,000 (\$70,000,000). It is claimed by the municipal authorities of Nottingham the reduction in the cost of electricity will mean a saving to the city of \$200,000 per annum in the operation of the tramways alone. The site for the station will require something like 100 acres, and it is estimated that 580,000 tons of coal per annum will be required, or 1,500 tons per day. Excellent facilities are provided, both by rail and water, for getting the coal to the plant. Various schemes have been suggested for utilizing the Trent River for power purposes, but experts are unanimous in the opinion that this plan is impracticable for the reason that there is not sufficient fall to the river. The completion of the proposed plant is expected to create an immediate boom in the industrial life of Nottingham and other cities in this section, as the present electricity supply is hopelessly inadequate and too expensive. Notwithstanding the high prices prevailing, there are many industrial concerns in Nottingham which are unable to get an extension of their power, although orders were placed many months ago. With reduced prices and an adequate supply of electricity, many of the old firms of Nottingham will extend the scope of their operations, and it is believed that many new industries will be attracted to the city by the inducements to be offered.

#### Plan to Use Garbage as Fuel for Street Lighting.

Scranton, Pa.—The city retained Frank Koester, consulting engineer and city planning expert, New York City, to make an investigation and report regarding an entire new system for lighting all streets and some forty municipal buildings. Mr. Koester proposed to use the garbage and refuse (60 tons per day) as the bulk of the fuel required; the present maximum daily demand of the power plant is 500 k.w.; however, the plant is provided for twice this capacity. Some 1,300 nitrogen-filled tungsten lamps are to replace the present arc lamps. In addition a very extended boulevard lighting system of some 400 single lamp standards are provided for the four business sections of the city. With the exception of the underground wires in the business sections all other wires of the eleven circuits are to be overhead. The engineers' report shows that the city will save yearly some \$25,000 by owning this municipal lighting system instead of renewing the contract with the local light company. A similar report was made very recently by the same engineer for the city of Allentown, Pa., where the savings affected would be \$15,000 per year.

#### State Can Change Gas Rate, Says Court.

New York, N. Y.—The Appellate Division of the Supreme Court has handed down a decision declaring the courts had the power to decide whether the statutory rate for gas was unconstitutional because it was confiscatory, and, having so decided, the rate to be charged could be fixed

by the Public Service Commission. The decision was in the suit of the Bronx Gas and Electric Company, which applied to the courts to permit it to charge more than the statutory charge of \$1 a thousand cubic feet. Terence Farley, counsel to the Public Service Commission, said that the decision of the court was a victory for the commission. He explained that the company sought permission to increase the rate as it pleased, or to have the court fix it on representations by the company. The commission, by its intervention through demurrers and other legal steps, had sustained its right to fix rates, he said. "The company," he explained, "will proceed with its action in the courts. If it is found that the company's statement of its financial situation is correct the result will be a decision to the effect that the statutory rate is confiscatory and therefore unconstitutional. The result of such a decision would be that the company would have to apply to the commission for an increase, and the commission, after a public inquiry, would have the power to fix a rate that would be fair." The order of the court reversed a decision of Justice McAvoy, who decided against a motion of the company to dismiss a demurrer by the Public Service Commission covering certain points in the company's complaint. Several other gas companies have similar suits pending in the State and Federal Courts. If the opinion of the Appellate Court stands, it will affect all of them similarly. The Appellate Division has also denied an application of the Brooklyn Gas Company to vacate a stay obtained by the Public Service Commission preventing the company from charging more than \$1.10 per thousand cubic feet for gas. It was said that it would require a charge of \$1.30 to meet operating costs.

## FIRE AND POLICE

#### Fire Department to Issue Educational Bulletins.

Boise, Idaho.—For several years the fire department of this city has endeavored to disseminate information and warnings relative to the conditions which tend to create or spread fires. This has been limited to the inspection of business establishments and the medium of the public press. The results from these sources have been gratifying, but the chief of the fire department, W. A. Foster, will soon inaugurate a novel improvement of this service. It is proposed to issue bulletins at regular intervals, probably once each month, in which will be indicated some of the fire hazards prevalent at that particular time of year. In addition to the warnings the bulletins will often contain information concerning other hazards and instruction as to how they may be eliminated or reduced. In order to make practical such a service, citizens are requested to furnish names and addresses from which a mailing list may be made up to receive the bulletins free.

#### Organizing for Two Platoon Plan.

Somerville, Mass.—Chief Rich, of the fire department, has completed his plans for operating on a two-platoon program which was approved by the voters at the recent election.

When the two platoon system for the Somerville fire department goes into effect, 90 days hence, a fireman will have his breakfast at home and report at the fire station where he is employed at 8 a. m. He will either bring his lunch with him or some one will take it to him at noon, for he cannot leave the station, except in the performance of his duty, until 6 p. m. He has his supper after going off duty.

The second day the program is the same, and yet again on the third day, until 6 o'clock. Instead of going off duty then and returning to his home, the fireman eats a supper that some one brings him and keeps right on with the performance of his duty until 8 o'clock the next morning. Then he goes home and gets his breakfast.

He reports for duty that night, the fourth day, at 6 o'clock, having first fortified himself with his supper, and remains at the station until 8 the following morning. Again, on the sixth day he does the same, but when he goes off duty the following morning he stays away from the station for 24 hours, that time being all his own.

During the 24 hours off duty the fireman may leave the city, that being his day off, which comes then once in six days instead of once in five days, as now. At any other time than his day off he must respond to all multiple alarms, that is a second, third or general alarm.

The routine of one fireman is like that of all the rest. When he is off duty another man takes his place, and when he is on duty the other man has his time to himself.

The department is divided into two equal parts, under the law for the two-platoon system, which work alternately day and night, but the two sections, or platoons, as they are called, alternate every three days instead of continuing regularly day and night.

If all the men of the fire department went to work under the two-platoon system on the same day, there would be only half of the department available on the sixth day. To prevent that condition from occurring, chief Rich has planned to start a fourth of the men on the first day, another fourth on the second day, the third fourth on the fourth day, and the last fourth on the fifth day, thereby distributing the minimum strength over a period of days.

The only exception will be in vacation, which the two-platoon system does not take into account. Extra men will have to be employed then, as now.

Under the old conditions the men were on duty continuously for four days of 24 hours each, with the exception of meal times, and then have the fifth day as time off. Their meal time amounts to three hours and a half a day, an hour for breakfast and an hour and a quarter each for dinner and supper.

Obviously the men are not all able to go at the same time to any meal, and are divided into three shifts for each. Between 6.30 a. m., when the first shift starts for breakfast, and 8 p. m., when the last detail gets back from supper, there is an aggregate period of ten hours and a half during which the department is at hardly more than skeleton strength, having but 44 men available at most.

The present strength of the department consists of 82 men. Of that number one-fifth, or 16 men, are away each day on leave. Of the 66 men remaining, one-third, or 22 are away at the same time to any one meal.

The department is, therefore, at its weakest between 6.30 and 9.30 a. m., between 11 a. m. and 2.45 p. m., and between 4.45 and 8 p. m. The morning and evening periods are apt to be those of a considerable number of fires. The department is at its maximum strength between 8 p. m. and 6.30 a. m., when, from some aspects, at least, there is the least need of it.

Under the two-platoon system these conditions will be changed. Chief Rich has figured that at least 30 more men will be needed to augment the force sufficiently to make one-half of it a properly effective working organization. Under the two-platoon system there will be 56 men on duty all the time, with half of that number available as a reserve force two-thirds of the time, and an equal number the other third of the time, if anything more than a one-alarm fire happens. At the present rate of pay, the 30 extra men would add \$36,000 to the expenses of the department.

#### Increased Pay for Policemen.

Northampton, Mass.—The common council has taken favorable action on the petition of the policemen for an increase in salary. This petition was acted on at the last meeting by the Board of Aldermen who favored the increase. The salaries of the police department according to the increase will be as follows: Chief, \$2,372; captain, \$2,190; sergeant, \$2,007; first-year men, \$1,358; second-year men, \$1,642; third-year men and thereafter, \$1,825—on condition that the police do not ask for another raise for five years. Capt. Lyons of the police force has stated the officers would give a written agreement if desired. It was decided not to require this, but to take the word of the men.

## TRAFFIC AND TRANSPORTATION

### Two Billion Rides a Year on New York Transit Lines.

New York, N. Y.—Statisticians of the Public Service Commission have just completed a compilation of figures showing the traffic on the transportation lines of the city during the last fiscal year, the variation in the traffic for the different months due to epidemics and other causes, and the increase in traffic over the preceding year. Based on the number of fares collected the figures show that during the year 2,079,942,004 passengers rode on the lines, an increase of 104,430,015 over 1918. A statement by the commission says: "The almost unprecedented growth in traffic for 1919 was in spite of the ravages of the influenza epidemic during the Autumn months of 1918, which caused a falling off in October alone of more than 12,000,000 fares, and for the period of July to November inclusive of 1918, of 17,000,000 fares." The report shows that the total increase of approximately 104,500,000 was divided between the various lines as follows: Rapid transit lines, 98,751,618; surface lines, 5,679,197. On the basis of percentages the total increase was 5.29 per cent., all of which went to

the rapid transit lines except .65 per cent. which went to the surface lines.

Details contained in the report disclose the fact that the largest percentage of gain was won by the elevated lines of the Brooklyn Rapid Transit System, where the growth was nearly 20 per cent., which represented a total traffic of 308,879,791, or an increase of 50,712,478 over that of 1918. The heaviest traffic on any single system was on the subway lines of the Interborough Rapid Transit Company, where the grand total of passengers was 461,147,058, which represented a gain of 10.23 per cent., or 42,889,050 more than were carried in 1918.

There was a decrease of 1.27 per cent. on the Interborough elevated lines, representing a loss of 4,472,059. These elevated lines carried a total of 348,188,000 passengers during the year. Figures of the business done by the Hudson & Mahattan Company disclosed a gain for the year of 12.70 per cent., or an increase of 9,761,817 passengers in a total of 86,050,815.

Figures on traffic on the surface lines, divided among the boroughs, show that in Manhattan the total traffic was 370,085,099 passengers; a loss of 1,051,290, or .28 per cent. less than in 1918; in Bronx there was a gain of 1.11 per cent. in a total of 80,806,261; in Brooklyn there was a gain of about one-half of 1 per cent. in a total of 362,103,192 in Queens the gain was 7.54 in a total of 3,275,369, while in Richmond the gain was 4.38 per cent. and the total was 15,958,213.

The report says that the traffic problem in the city is exemplified by the fact that since 1903, a period of sixteen years, the traffic on all of the transportation lines has more than doubled, and that the billion mark was first passed in 1903. It appears from the figures that the average traffic each day during the last fiscal year was 5,700,000, which about equals the population of the city. Toward the end of the year the daily averages of rides increased to 6,400,000. The fares per capita collected in 1860 were 43, and in 1919 the number had increased to 370 which shows, according to a comment in the report, that the habit of riding is growing steadily more popular. Then the report says: The increase of 104,430,815 passengers brought approximately \$5,220,000 additional revenue to the railroad companies, which with revenue other than that gained by operation of the lines, yielded a total revenue for the year of \$110,191,682, or \$6,690,919 more than in 1918. Operating expenses increased greatly, however, the total of these increases being \$15,267,181, which caused a deficit in net income of \$8,085,819. The average cost of transporting each passenger (no allowance being made for taxes, interest, or dividends) was 3.446 cents in 1919, as against 2.293 cents in 1918, and 2.638 cents in 1914."

### Motor Truck Limitations in Pennsylvania.

Harrisburg, Pa.—The question of licensing trucks having a width greater than the 90 inches fixed by law was brought up by a delegation from the Motor Truck Association of Philadelphia to the state highway commission. Commissioner Sadler explained that there can be no deviations from this phase of the act of June 30, 1919. Weight requirements as fixed in that law will also be strictly enforced; and inspectors will arrest drivers on trucks exceeding the gross-weight limit as stamped on the side of trucks. "It is not the idea of the legislature or the State Highway Department in any way to interfere with the development of truck transportation," commissioner Sadler said. "Trucks are here to stay. But we must consider them from five points of view—length, breadth, weight, lights, and the character of the person operating them. Because of the heavy trucks in use, and the foundations we must build to carry them 365 days a year, our roads are costing us \$25,000 a mile more than would be necessary had we only passenger cars to contend with. We asked the legislature to set a truck weight so that we could build our roads to carry that weight. They have fixed a limit of 26,000 pounds. We are building our roads accordingly, and trucks must stay within that weight. Our regulations have all been made for the safety of the traveling public. We ask the truck owners and manufacturers to co-operate with us. The day of the road outlaw is past." "There will be 500,000 motor vehicles in Pennsylvania in 1920," said commissioner Sadler. "Possibly 50,000 will be trucks. The rights of the other 450,000 owners of cars must be protected and respected. Regulations which apply to passenger cars and to small trucks equipped with illuminating devices must apply to the larger trucks. Drivers of passenger vehicles must not be compelled to drive in fear of inconsiderate drivers who know that in a collision their large vehicles would suffer only slight dam-

age." The representatives of the Motor Truck Association said that large trucks were not supplied with lights other than oil signal lamps on each side; and that electrical devices were not practical. "It would seem to me," said the commissioner, "that manufacturers, in view of the requirements of the Pennsylvania law, should begin to supply lights; and that their engineers should develop a practical lighting system. Here is the law; we cannot modify it." Commissioner Sadler called attention to the fact that many trucks from the cabs of which drivers are unable to see back of them are not equipped with fender or other mirrors. The law in this particular will be strictly enforced, he said; and the delegation agreed with him that it should be.

## MISCELLANEOUS

### St. Paul Invites City Planners to Compete.

St. Paul, Minn.—Letters to all of the best known city planning experts in America have been sent out by the City Planning commission in an effort to create competition for the position of consulting planner for St. Paul. The commission hopes to agree on an advisory city planning expert very soon. A local executive will be hired before then, it was stated. Every consideration will be shown St. Paul men who possess the requisite qualifications in the selection of a planner, members of the commission announced. The commission has written to other cities which have taken up community planning, in order to get the benefit of their experience.

### Interstate Park Closes Biggest Year.

New York, N.Y.—According to a report by George W. Perkins, president of the New York Commission of the Interstate Palisades Park, 621,000 people went to Bear Mountain Park; 192,000 rode on the sight-seeing buses; 400,000 went the Palisades region; 50,000 used the Park bath houses; 50,000 campers spent an average of eight consecutive days each somewhere in the Palisades Park system; over one million sales were consummated at Bear Mountain Inn. This, in part, is the record of achievement of the Palisades Interstate Park for the past summer. In issuing these figures Mr. Perkins said: "The fact that over a million people have visited the Palisades Park system during the past summer is a gratifying result of twenty years' work. There have probably been more visitors to the Palisades Interstate Park this season than there are visitors in one year to all of the national parks of the United States. The popularity of the Palisades Park lies in the fact that it is a State playground, administered by an unpaid Commission, the sole aim of which is to give the people of New York and New Jersey a chance for wholesome recreation." Over 400,000 people enjoyed free row boating at Bear Mountain. Probably no other public park in the country permits the free use of row boats. A large open-air dance pavilion with music provides wholesome dancing, under supervision, to thousands of couples every season without cost. A new development at Bear Mountain Park has been the mothers' rest station, where nurses care for children while the parents spend the day around the Park. This has been a great boon to many tired mothers, who, without such a facility, would find no respite from family cares. Over 50,000 people, mostly children, spent an average of eight consecutive days' vacation each, in the 49 group camps in the Park. Provision was made for the undernourished, the crippled, the blind, tenement mothers, working boys, working girls. There was a daily census of 1600 Boy Scouts. Although many of these camps are 17 miles from Bear Mountain, most of them were supplied with hot, cooked food from Bear Mountain Inn, sent by automobiles in heat retaining vessels. The camps are located on lakes with plenty of fishing, bathing, hiking, games and camp-fires. Approximately 9,550 of the campers were poverty cases. Over 42,000 paid from \$3 to \$6 for board; 30,000 were children under 14 years; 12,250

## LEGAL NOTES

### A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

#### Contract Let Without Bids—Work of Auditor

(N. J. Sup.) Act April 1, 1912 (P. L. p. 593), prohibiting the award of a contract for the doing of work or furnishing of any material or labor in excess of \$500 except to the lowest responsible bidder after public advertisement, does not invalidate resolution of commissioners of a city selecting auditors of city's books for a year, as required by statute, at a compensation of \$1,175, such services not constituting "work, materials, or labor."—Heston v. Atlantic City, 107 A. 820.

#### Tenement House Law—Rags as Inflammable Substances— Definition of "Lot."

(N. Y. Sp. Sess.) Small particles or fragments of cloth, assembled promiscuously, with extensive intervening air spaces, constitute "rags" within the meaning of the Tenement House Law, providing for protection against fire, and prohibiting storing or handling of inflammable substances.—People v. Krinka, 177 N. Y. S. 846.

The term "lot," as used in Tenement House Law, §§ 2, 38, 50, 52, 53, 54, 60, 61, 124, prohibiting the storing or handling of certain inflammable substances means property possessing certain elements of unity, such as singleness of ownership, entirety in use, separation by physical environment or community custom, and where all such elements are present, except singleness of ownership of the two parts, other circumstances, including mortgages, the relation of the owners of the parts, and recent ownership of the whole by one of them, will be held to indicate that there has been no severance which can alter the application of the Tenement Law charged to have been violated.—Id.

#### Negligence of City—Barriers on Retaining Walls—Injury of Pedestrian.

(Pa.) A city was grossly negligent in failing to place any barriers or guards along the retaining walls of a street running along the side of a creek from 7 to 11 feet below.—Haughney v. Mahanoy City Borough, 107 A. 843.

A pedestrian could not recover damages from a borough for injury from falling from a street over a retaining wall, which had no guards or barriers, into a creek from 7 to 11 feet below, where, though the night was dark, she was familiar with street, and had three other safer and better lighted routes, and where she testified that she did not look where she was going, and did not look for the creek, although she knew of it.—Id.

were tenement mothers or self-supporting working boys and girls. Bear Mountain Inn, operated by the Commissioners, was built for the purpose of supplying wholesome food at cost to visitors. The bathing beaches and bath houses in the Palisades region, opposite congested Manhattan, were more popular than ever this last season—over 41,000 using them. Of this number 29,366 paid from 10 to 25 cents each for bath house privilege, while 12,144 used the bath house without charge. Approximately 5000 individuals spread tents, under permit, in a tent colony north of Alpine, N. J., and at old Fort Clinton, at Bear Mountain, N. Y. Whole family groups camped here for the season. "One of the reasons the public takes such hold on the Palisades Park development," said Mr. Perkins, "is that no concessions whatever are let in the Park—the Commissioners operating the restaurants, automobiles, camping and other facilities. Owing to the tremendous increase of visitors to all sections of the Park, the Commission has under advisement a number of improvements, which will make this popular resort of even greater attractiveness and value."

## NEWS OF THE SOCIETIES

**Jan. 28.**—WESTERN SOCIETY OF ENGINEERS. Annual meeting, Chicago, Ill. Secretary, Edgar S. Nethercut, 1735 Monadnock Block, Chicago, Ill.

**Feb. 9-13.**—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

**Feb. 16-18.**—INTERNATIONAL CITIES AND TOWN PLANNING ASSOCIATION. Annual meeting, London, England. Honorary secretary, C. B. Purdon, 3 Grays Inn Place, London, W. C., England.

**Feb. 20-21.**—AMERICAN CONCRETE PIPE ASSOCIATION. Annual meeting, Chicago, Ill. Secretary, G. E. Warren, 210 South LaSalle street, Chicago, Ill.

**May 18-21.**—NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention, Pasadena, Cal. Acting secretary, S. A. Sewall, 29 West 39th street, New York City.

**June 21-25.**—AMERICAN WATER WORKS ASSOCIATION. Annual meeting, Montreal, Canada. Secretary, John M. Diven, 153 West 71st street, New York City.

### American Road Builders' Association.

Members of the American Road Builders' Association and other highway or allied organizations, duly appointed delegates and all others interested in highway improvement have been invited to the tenth American Good Roads Congress, the seventeenth annual convention of the Association and the eleventh National Good Roads Show which will be held at the Jefferson County Armory, Louisville, Ky., February 9 to 13.

The program covering the several sessions of the congress will include the subjects of highway construction, transportation and maintenance; also the administration and financing of national, state, county and municipal highways. Papers and addresses by leading highway authorities and reports on live topics by the several committees of the American Road Builders' Association will be presented for discussion. All sessions of the Congress will be held in the Convention Hall of the Armory, one flight above the floor on which will be held the exposition of road and paving machinery, materials and methods.

The first session of the congress will be opened in the afternoon of February 9 by addresses of welcome by local, state and city officials and an address in response by the president of the association. This will be followed by the presentation of papers and reports of committees and discussions during the remaining days of the Congress. It is proposed to have moving pictures on Monday and Tuesday evenings, a reception or ball (formal) on Wednesday evening and the association dinner (informal) on Thursday evening. On Friday afternoon the members of the association will hold a business session.

Papers and discussions on the following subjects will be presented:

"Cooperation Between Engineers and Contractors in the Execution of Highway Programs."

(Copies of paper by contractor to be furnished to two engineers and two contractors, who will be asked to open discussion.)

"Modern Plant and Equipment for Highway Construction."

"Status of State Aid to Counties and its Future Development."

"Should the Township and the District Board be Abolished as a Road Construction and Maintenance Unit?"

"Is State Supervision of the Construction and Maintenance of all Highways Desirable?"

Committee report on "What Part of the Total Cost of Highway Construction and Maintenance Should the Motor Vehicle be Expected to Bear?"

"Factors which will Limit Highway Construction During the Coming Season."

(a) Car Supply and what can be done to overcome the shortage.

(b) Materials—The development of local supplies and increasing the output of existing plants.

(c) Labor—How can supply and efficiency be increased?

"The Fundamentals of Early Highway Construction and are we Neglecting Them?"

"What are the Fundamentals of Modern Highway Construction?"

"New Highway Tests Being Made by the Bureau of Public Roads."

"For What Grade of Construction Should the Federal Aid Funds be Expended?"

"New Developments in Proper Construction of and Bad Practice which Should be Eliminated in Concrete, Brick, Granite and Wood Block, Bituminous Penetration, Bituminous Mixed and Surface Treated Macadam and Gravel Pavements."

The exhibition of machinery, materials and methods which will be held on the first floor of the Armory is expected to be the most complete exposition of the kind ever held. It will embrace the various kinds of labor-saving machinery and appliances as well as materials used in the construction and maintenance of improved roads and pavements.

### National Highway Traffic Association.

The annual convention of the National Highway Traffic Association will be held January 29 in the International Amphitheatre, Chicago, Ill.

At the morning session Arthur H. Blanchard, president of the association, will be chairman. The following program will be presented:

Report of committee on "Highway Transport Franchises," chairman, F. W. Fenn, secretary, Motor Truck Committee, National Automobile Chamber of Commerce.

Report of committee on "Interrelationship of Highway, Railway and Waterway Transport," chairman, Pro-

fessor Henry E. Riggs, University of Michigan.

"Effect of Car Tracks on Traffic Capacity of Roadways," by George W. Tillson, consulting engineer, La Grange, Illinois.

Report of committee on "Traffic Limit Lines on Roadway Surfaces," chairman, C. W. Hubbell, city engineer of Detroit, Michigan.

Report of committee on "Sign Posting for Detours, and Through Routes in Municipalities," chairman, Elmer Thompson, secretary, The Automobile Club of America.

The afternoon session will be a joint session of Highway Transport Conference of the National Automobile Chamber of Commerce, and the National Highway Traffic Association on the subject: "Highways and Motor Transport." The chairman of session will be David Beecroft, vice-president, North Atlantic Division, National Highway Traffic Association. These papers will be read:

"Taking an Interest in Motor Truck Legislation," by Harry Meixwell, Jr., secretary, Automotive Industries Legislative Commission, New York.

"Value of Highway Transport Surveys," by F. Van Z. Lane, transportation engineer, Packard Motor Car Company.

"Interrelationship Between Highway Transport and Back-to-the-Farm Movement," by S. V. Norton, B. F. Goodrich Rubber Company.

The evening session will be a joint session of Highway Transport Conference of the National Automobile Chamber of Commerce, and the National Highway Traffic Association on the subject: "Highways and Motor Transport." The chairman will be R. C. Hargreaves, vice-president, North Central Division, National Highway Traffic Association. The following will be presented:

"Relation of Highways to Motor Truck Operating Cost," by Arthur H. Blanchard, Professor in Charge of Highway Transport, University of Michigan.

"Progress in Highway Improvement," by William G. Edens, president, Illinois Highway Improvement Association.

"Constructing Roads for Motor Truck Traffic," by T. R. Agg, Professor of Highway Engineering, Iowa State College.

"Status of Legislation Relative to Snow Removal from Inter-and Intra-State Highways," by Raymond Beck, chief, Goodrich National Touring Bureau.

### Indiana Engineering Society.

The Indiana Engineering Society will hold its annual meeting January 23 and 24 at the Claypool Hotel, Indianapolis.

Prof. G. A. Young, Purdue University, Lafayette, Ind., will deliver the presidential address. The following papers will be presented:

(Continued on page 38)

# NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

## LITTLEFORD PATROL HEATER.

For Heating Bituminous Materials in Highway Repair Patrolling.

A small portable heater for heating tar and other bituminous materials has recently been designed and placed on the market and has already become widely popular, particularly in those highway departments operating a patrol system.

The Littleford patrol heater is a one-man kettle with which a patrolman, covering a limited mileage, is able to make patches as soon as a road begins to show wear. The patrolman takes this gravel and can repair a crack or worn spot in almost any type of surface.

The heater is durably constructed of sheet steel, but not too heavy, and it is so designed as to be easily handled by one man. The fire box is fitted with a cast iron grate and hinged fire door. The welded kettle rests entirely within the fire box and is removable. It has a capacity of eight gallons.

The heater, which is shown in the accompanying illustration, is made by Littleford Bros.

## ALLEN LOCKING DIFFERENTIAL.

For Cars, Trucks and Tractors—Gearless and Frictionless.

The Allen differential is designed to get away from the gear differential and its limitations on motive power and its possibilities for danger from skidding. The Allen differential is claimed to be the nearest approach to a solid axle of any mechanism that affords compensation yet invented. It is gearless, frictionless and self-locking. It is therefore claimed to give increased motive power, to prevent

skidding and to enable a vehicle to pull through mud, snow or sand regardless of lost traction on either wheel; to save gas, tires and wear and to eliminate friction and lessen strain.

The principal of this differential is based on the proper construction and application of the pawl and internal ratchet, positively controlled. There is a ratchet ring having a splined hub for each wheel shaft (right and left hand); the pawl block carrying the driving pawls on each side for forward and reverse driving. The pawls are set in the pawl block with limited movement, and the whole is secured in the casing to which the main gear wheel is either riveted or bolted. The driving mechanism—ratchet rings, pawl block and pawls—is assembled and secured in the inner or differential casing. The pawl block driving lugs are secured in slots in the casing with a limited movement, about 3-16 of an inch, which movement automatically changes the pawls from forward to reverse drive. This makes the freedom of movement of this differential but 3-16 of an inch, and the running absolutely noiseless, and without shock.

The strain on all parts of the "Allen" is of compression only; no torsion—no tension. It gives a positive two-wheel drive, and occupies the same space in the housing as the one-wheel drive gear differential.

When the mechanism is pulling both wheels, all parts move together as a unit. When one wheel travels faster than the other—as when rounding corners—there is no lead on that member; hence no wear.

When rounding corners or running circles, the wheel on the long curve overruns the driving pawls, making it a free wheel. The wheel on the short curve drives the load. Should the driv-

greatly increased because all of the power lost in operating a gear differential is saved. No power is lost through the "Allen" because there is no friction through which to lose it. Mechanical resistance against the motor is eliminated. This differential is particularly adapted for heavy service on trucks used in hauling and construction work.

The East Iron & Machine Co. is sole lessee of the Allen patents for the United States and Canada.

## INDUSTRIAL NEWS

Material Handling Machinery Manufacturers Association.

The Material Handling Machinery Manufacturers Association will hold an open convention at the Waldorf Astoria Hotel, New York, N. Y., for two days, January 29-30. This meeting is intended to be a "get together" two days for all manufacturers of mechanical handling machinery, accessories and equipment.

Manufacturers will be welcome from any part of the country who make cranes of any kind, hoists, winches, portable, gravity and power conveyors, industrial trucks, tractors and trailers, bulk handling machinery, elevators, motors and electrical control apparatus, batteries, ball-bearings, wire and manilla rope used in the construction of mechanical handling machinery, hand lift trucks, etc., etc. In other words, the association invites representatives of all manufacturers who make machinery or equipment for machinery which handles raw products, parts in process and finished products, by mechanical movement rather than by manual physical labor.

Details of the program are being completed and arrangements have been made to hold a morning business session on January 29, followed by a formal luncheon at the hotel with a prominent speaker, and an afternoon session, at which short papers on mechanical handling will be read, followed by open discussion and moving pictures.

The morning of January 30 will be devoted to an executive session of the membership and the afternoon will be a continuation of the papers and discussion on mechanical handling followed by a moving picture program of a number of the latest and largest installations.

Anybody interested in the art of mechanical handling, either as a manufacturer or otherwise, is invited to at-



Littleford Patrol Heater for Road Repair.

ing wheel encounter any condition that would cause it to lose its traction, the wheel on the long curve picks up the load, carrying the vehicle along until the wheel on the short side of the curve again takes the pull. In case mud-holes, ice, snow, sand or slush are encountered, if either wheel can get a grip on the road, the vehicle will be carried safely through. Should a drive shaft or chain, on either side, break, the car will keep running just the same.

By using the "Allen" motive power is

tend the luncheon and the meetings.

The secretary and manager of the association is Zenas W. Carter, 35 West 39th Street, New York City.

**J. D. Adams & Co.,** Indianapolis, Ind., has ready for distribution, the new 1920 catalog which is said to be the most elaborate and most complete catalog ever published on road graders.

The complete line of Adams adjustable leaning wheel graders is shown in three colors, full descriptions of each grader are given as well as complete specifications, and the entire catalog is profusely illustrated with scenes of Adams graders in action. The principle of the leaning wheel feature of Adams Graders is also explained and illustrated in a simple and comprehensive way.

In addition to graders, the catalog lists the Adams line of road maintenance and construction machines and tools. The catalog contains 64 pages, mostly illustrations, and certainly should be of value of anyone interested in road building and maintenance equipment. It is mailed free upon request.

#### **Pneumatic Cord Tires Allow Heavier Loads on Lighter Trucks.**

That the pneumatic cord tire is working radical changes in the construction of motor trucks by permitting a much heavier pay-load to be carried on lighter weight trucks, appears from recent tests.

In experiments recently conducted by **The Goodyear Tire & Rubber Co.,** Akron, Ohio, which operates a fleet of 50 trucks in the transportation of freight and passengers, complete truck weight has been cut to 8,000 lbs, permitting a record pay-load of 7,000 lbs. The truck in question is composed of a two ton chassis, a three ton motor and 38 x 7 and 42 x 9 tires.

This development of truck transportation has already proved to the company that it can haul its own products from the factory to branch offices at a saving in freight rates. It would appear to indicate possibilities of sweeping reductions in the hauling expense of many large transportation companies that have not changed over from solids to pneumatics.

Heretofore it was supposed that pneumatics would not make any material difference in truck construction, nor was it supposed that any heavy type of truck could be equipped with less than 44 x 10 tires on the rear wheels. But the company kept close check on the performance of trucks and tires even to the extent of sending several of its express trucks on coast to coast trips.

A truck weighing 15,800 lbs, carrying a pay-load of only 3,850 lbs, was stripped to 11,800 lbs and developed a pay-load of 5,800. It was still considered too heavy in proportion to the load carried. A further reduction resulted in a 10,000 lb. truck with a pay-load capacity of 6,800 lbs. This was fol-

lowed with the 8,000 lb. truck now carrying a load of 7,000 lbs.

It is the belief of company experts that the end is not yet in sight and that on heavier type of truck, pneumatic tires will sustain a pay-load equipment to the weight of the truck. It is not altogether impossible that eventually the pay-load will out-weigh the truck.

## **NEWS OF THE SOCIETIES**

(Continued from page 36)

"Recent Proposals for Educating Engineers," Prof. W. K. Hatt, Purdue University; "Paper and Report on Mechanical Engineering," Prof. Frank C. Wagner, Rose Polytechnic Institute, Terre Haute, Ind.; "Big Things Confronting the Engineer" (Illustrated), Prof. F. H. Newell, University of Illinois, Urbana, Ill.; "Talks by Indiana Engineers in the Service," led by Col. W. S. Boyle, Indianapolis, Ind.; "License Law for Engineers."

"Electrically Operated Pumping Plants in Indiana," S. C. Blalock, Lafayette, Ind.; "Report on Electrical Engineering," Prof. D. D. Ewing, Purdue University; "Power Factor and Load Factor—Effect on Central Stations," H. C. Thuerk, Lafayette, Ind.

"The Engineer and the Contractor—Their Relation," C. D. Franks, Indianapolis, Ind.; "Gravel Specifications in Indiana," B. C. Yeoman, Indianapolis, Ind.; "Indiana Highway Problems," by a member of the State Highway Commission; "The Remedy for the County Surveyor's Office," Earl A. Gibbons, Terre Haute, Ind.; "Report on Civil Engineering," W. J. Titus, chief engineer of bridges, Indiana State Highway Commission, Indianapolis, Ind.; "Highway Lessons of the World War," Prof. G. E. Martin, Lafayette, Ind.

#### **American Association of Engineers.**

The Twin City Chapter of the American Association of Engineers has been elected a member of the Minnesota Joint Engineering Board, and has appointed for its representative for the first year, Professor Frederic Bass of the University of Minnesota. Professor Bass is a chairman of the National Committee of Engineering Education and a consulting and advisory editor of the "Professional Engineer."

Chapter charters have been granted by the American Association of Engineers at St. Joseph, Missouri; Charleston, West Virginia; Oregon State College, and club certificates at Poplar Bluffs, Missouri, and Peoria, Illinois.

## **PERSONALS**

McClendon & Purnell is the name of a new engineering firm, with offices at Mineral Wells, Tex. The members

of the firm are Wm. W. McClendon, a graduate of Texas A. and M., and A. B. Purnell, of Louisiana State University. Mr. McClendon has been city engineer of Mineral Wells for the past five years and has been in direct charge of all paving. Mr. Purnell was a Lieutenant in the 114th Engineers Corps and has had a varied experience in road repair and maintenance in France. The new firm will specialize in municipal and highway work. Mr. McClendon will still act as city engineer and Mr. Purnell will have direct charge of all outside work. The new firm has been supervising asphalt macadam paving and constructing a big storage reservoir in Mineral Wells.

Marshall, U. S., senior highway engineer in the United States Bureau of Public Roads, until recently in charge of the Missoula branch office of the bureau, has resigned to accept the position of assistant chief engineer with the Montana State Highway Commission, at Helena.

Chase, Lieut. Waldo H., U. S. A., recently discharged from service after a year overseas, has resumed his position as engineer with the northern division of the state highway department, California.

Gwillim, E. C., has received the appointment as city engineer of Sheridan, Wyo., to fill the vacancy created by the resignation of H. M. Huntington. Mr. Gwillim was recently discharged from military service.

McFall, James, having finished his work as general fire and guard marshal of the Emergency Fleet Corporation, has accepted a position with the West Penn Power Co., Pittsburgh, Pa. His new address is P. O. Box 1223, Pittsburgh.

Brownell, Capt. O. E., Engineers, U. S. A., who recently received his discharge, has become associated with Morell & Nichols, landscape architects and engineers, Minneapolis, Minn. He will take charge of civil and municipal work. Before entering the army Captain Brownell was chief assistant city engineer of Duluth.

McLain, Capt. G. L., U. S. A., former city engineer of Hutchinson, Kans., has been appointed assistant engineer, Bureau of Public Roads, and has been assigned to the Omaha district, in charge of Kansas work. Captain McLain organized Co. A., 110th Engineers, and has just returned from sixteen months' service in France.

Whipple, George C., Professor of Sanitary Engineering at Harvard University and member of the firm of Hazen, Whipple & Fuller, expects to sail January 24 for Geneva, where he will take charge of the Division of Sanitation of the League of Red Cross Societies, of which he is director. He expects to be absent from his chair at Harvard for one term only, returning to this country in September.